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ENDOSCOPY OF THE ABDOMEN; ABDOMINOSCOPY[1]

A PRELIMINARY STUDY, INCLUDING A SUMMARY OF THE LITERATURE AND A DESCRIPTION OF THE TECHNIQUE

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HOW often is not the surgeon or the diagnostician confronted with a case in which the difficulties of reaching a decision urge the desire to get a glimpse of the body interior!

After the method had been perfected of exploring with light and lens the open cavities of the body, such as the rectum, bladder, œsophagus, trachea and bronchi, the idea of making the closed cavities accessible to the eye in a similar manner became more insistent. The vision of the potentialities of such a procedure was too fascinating to go long unheeded, and consequently we find several independent attempts to realize the conception.

The first demonstration and application of abdominoscopy was successfully carried out almost 25 years ago, and yet, strange to say, the method is but little used. In part, the reason for this reluctance to apply it is seen in the traditional though wholesome conservatism with which every new scientific thought contends, and which in the field of medicine bulks large because of the enforced cautiousness when we are dealing with human life. But hitherto, the endoscopic method of examining the closed body cavities has hardly met with a clinical mishap which could serve as a hindrance to its acceptance.

Impressed with the possibilities which endoscopy of the abdomen offers not only in the field of diagnosis and treatment but in the solution of certain physiological problems as well, the writers deemed it advisable to spend further thought and time in experimentation with it. To learn how much attention and effort had been given to it already, a thorough search was made in the literature. Inasmuch as a résumé of the papers on this subject has not, to our knowledge, been given before, we are here presenting the results of the survey.

REVIEW OF LITERATURE

In the autumn of 1901, at the Seventy-third Congress of German Naturalists and Physicians, which had convened at Hamburg, Kelling, a surgeon from Dresden, demonstrated a living dog into whose abdomen he had inserted a cystoscope for the purpose of examining the viscera. This method, which he named "cœlioscopy" in short was as follows: After a small area of the ventral abdominal wall had been made anæsthetic, he introduced a Fiedler puncture needle, and through it inflated the peritoneal cavity with air that had filtered through sterile cotton. He then passed a second, somewhat larger trocar through the anæsthetized area, and replaced its stylet with the thinnest Nitze cystoscope. Not only could the internal organs be seen distinctly when the instrument was moved about, but they could also be palpated and their consistency felt,

[1]This work was carried out at the Augustana Hospital and the Research Institute of the University of Illinois College of Medicine, under grant of the Graduate College. Read before the Chicago Surgical Society, April 3, 1925.

either by means of the endoscope itself or by means of a blunt probe projected through the first trocar cannula.

Kelling's address was also published in the *Muenchener medizinische Wochenschrift* in January, 1902. Although he is not explicit as to his having tried cœlioscopy on human beings before this time, we are led to assume as much, which is confirmed in a later paper (1910). He gives instructions regarding the preparation of the patient, saying he should be purged beforehand in order to preclude injury to the intestine during the perforation of the abdomen. Further, he considers the presence of peritoneal adhesions a contra-indication to the method. In conclusion he promises a larger treatise on the subject, which unfortunately never appeared.

In 1910, the first paper by Jacobaeus of Stockholm on a like procedure of visceral exploration, developed independently by him, called forth a short statement by Kelling. He remarks that in the two instances in which he tested the method of cœlioscopy on human patients, he succeeded readily. Moreover, it has been frequently used in the Veterinary Institute of Dresden in the course of certain physiological experiments, particularly in the study of peristalsis. Adding to his original report, he says that the trocar was so constructed that its distal end could be bent at right angles to its axis after the withdrawal of the stylet. This end functioned as a tractor, because with it the margins of the liver, for example, could be lifted up or pushed aside.

Recently (1923), after 13 years of silence on the subject of cœlioscopy, Kelling briefly addressed the German Surgical Society concerning it. He related how the bad economic situation of the population after the war had compelled him to make wider use of this diagnostic method among his patients, since it saved them the prolonged and costly stay in the hospital which an exploratory laparotomy entails. With its aid he was often able to determine whether or not a case of carcinoma of the stomach, for instance, was still operable, as witnessed by the presence or absence of metastases in the liver. Besides its value in differential diagnosis, it revealed the existence and location of adhesions.

Kelling now has simplified the method in so far as he pierces the abdominal wall only once during the process. He employs a trocar which, like a puncture needle, has a point with a single, elliptical, bevelled surface, placed at an angle of 45 degrees. It is also grooved lengthwise on one side to accommodate a small tube attached to the trocar sheath on its inner surface for the transmission of air. He maintains that the mobility of the intestines in the living is such that they will not sustain injury but will recede or slip aside before the gentle and slow thrust of the trocar.

The followers of Jacobaeus are prone to overlook the achievement of Kelling. His work becomes all the more remarkable when we consider that the technique which he applied and described almost 25 years ago is with little modification the technique used today. He made use of the artificial pneumoperitoneum long before it was practiced in the field of roentgen diagnosis. But Kelling failed to make early clinical application of his method. Further, unlike Jacobaeus, who 10 years later published his own work in a number of different foreign journals, Kelling did not give his work the publicity which it deserved and demanded.

In 1901 and 1909, Ott, a gynecologist in Petrograd, described another method of direct illumination and examination of the abdominal cavity. This method, which he called "ventroscopy," in reality represents a modified laparotomy. It consists in making a small incision through the abdominal or the vaginal wall, separating and raising its margins with the specula, and reflecting a strong beam of light into the more distant parts of the cavity with a head mirror, or from a small electric bulb fastened to the speculum.

Kraske of the University of Freiburg in 1902 published a note on suprapubic cystoscopy which he performed on men in whom the urethra did not permit the passage of the instrument. At first he introduced the endoscope through a trocar, but later had one made with a stylet point, so that it served both functions.

Jacobaeus, in 1910, published his first contribution on cystoscopy of the pleural, pericardial, and peritoneal cavities, which method he termed "thoraco-laparoscopy," and which in all essential details corresponds to that devised by Kelling. The trocar tube, however, differed in the possession of a trap-valve which closed when the stylet was withdrawn, thereby preventing the escape of air from the body cavity.

For inflation of the peritoneal cavity, Jacobaeus had tested puncture needles of different degrees of sharpness, in addition to the larger trocars, on laboratory animals and human cadavers, and he found that only when brutal force was brought to bear upon them was there any danger of injuring the viscera. Because of the lack of mobility in the organs in the corpse, they were damaged more readily than in the living. After such preliminary experiments he tried the method on three patients with success. The trocar which he used at this time had a diameter of No. 17 Charrière, and the Nitze cystoscope which he passed through it one of No. 14. Later, he used cystoscopes of smaller dimensions (No. 12 Charrière).

At first, Jacobaeus did laparoscopy only on patients with ascites, but subsequently extended its employment. In 1911, he gave an account of 115 examinations made on 72 patients, 45 of which were suffering from abdominal and 27 from pulmonary and pleural ailments. With the endoscope he was able to distinguish between cirrhosis of the liver, lues, metastatic tumors, tuberculous peritonitis, and between the several pleural affections. It is interesting to note that already in 1911, Jacobaeus, when comparing the merits of thoracoscopy and laparoscopy, views the former method with greater favor and predicts for it a greater future.

In a monograph, published in 1912, Jacobaeus exhibits five plates of illustrations, some colored, displaying the appearance of the diseased viscera, as seen through the endoscope. In that treatise, and in smaller contributions, he names the investigators who are testing his method—such men as Brauer and Hegler of Hamburg to whom he personally demonstrated his work, Janssen of Copenhagen, Tedesko of Vienna, Bâlint of Budapest, Forlanini of Pavia, Bacelli of Rome, and Parturier of Paris.

After 1913, Jacobaeus seems to have neglected laparoscopy and to have devoted his major interest and energy to the perfection of thoracoscopy both as a diagnostic and as a remedial measure. With his technique of galvanocautery for the separation of strands of adhesions within the pleural cavity, he has been able, in approximately three-fourths of the cases so treated, to sever them sufficiently well, under the guidance of the thoracoscope, to permit the lung to collapse, and thus make possible the full therapeutic effect of artificial pneumothorax in pulmonary tuberculosis.

Bernheim, an American, in 1911, described a method of abdominal exploration which he had attempted before he learned of the work of Kelling and Jacobaeus. He had begun some experiments at the Johns Hopkins Medical School to test its feasibility and thereupon tried it on two patients. He proceeded as follows: Through a short incision made in the epigastric region, he introduced a proctoscope of ½ inch bore, the distal end of which was blunted by means of a metal collar. This end was shoved

in until it rested on the ventral wall of the stomach. An electric headlight furnished the illumination. The peritoneal fluid facilitated the gliding of the instrument over the surface of the organ. He was able to inspect the lesser and greater curvatures of the stomach, the gall bladder, the underlying surface of the liver, and, by tilting the tube, the parietal peritoneum as far as the diaphragm.

In 1912, Nordentoft of Copenhagen, and his brother, designed an instrument which they called "trocar-endoscope," and not knowing of the previous work of Kelling and Jacobaeus, they had it patented. In principle, their methods are identical. The purpose of the instrument, according to Nordentoft was three-fold, since it could be utilized (1) in suprapubic cystoscopy; (2) in "arthroscopia genu," when inspection, palpation, and roentgen examination of the knee failed to disclose the nature of the affliction; and (3) in physiological experiments and observations within the body cavities of animals. With his endoscope, Nordentoft also viewed the interior of the pelvis of a female cadaver placed in Trendelenburg's position, and obtained a striking picture of the genital organs, especially after the abdomen had been inflated. He believes one would hardly dare to carry out such an experiment on a living human being, although it might in certain cases supplant an exploratory laparotomy.

In 1912, at one of the monthly sessions of the Society of Internal Medicine and Pediatrics in Vienna, Tedesko told of his experience with the method of laparoscopy, as practiced by Jacobaeus. He had only tried it on patients with ascites. The discussion which followed his paper shows that the method had already been put to a trial and had been retained by some of the clinicians of Vienna (Schlessinger and Sternberg) but had been rejected by others (Singer and Salamon) as being too dangerous.

Stolkind, a Russian, finds (1912 and 1919) thoracoscopy a valuable adjunct in the diagnosis of pulmonary diseases, but he would restrict the application of laparoscopy merely to those cases in which an exploratory laparotomy is not possible.

In South America, Meirelles (1913) has published a discussion on laparoscopy. Of the bibliography on this matter, his paper was the only one the writers were unable to secure for perusal.

In France, papers by Renon (1913–1915) and Rosenthal (1913) have appeared on the work of Jacobaeus. Though Renon considers laparoscopy an excellent method for making visible to the observer certain affections of the liver and the peritoneum, he is not certain that it will be helpful in the diagnosis of intestinal lesions. Like Jacobaeus, Rosenthal believes thoracoscopy to be the more important method since it opens a new field of attack, whereas laparoscopy must compete with the traditional exploratory laparotomy.

In Italy, Roccavilla (1914 and 1920) modified the method of Kelling and Jacobaeus by designing an instrument which permits the source of light to remain outside the abdomen. A strong beam of light is reflected into the trocar tube. An ocular placed in the direct axis of the tube, but a short distance above it, magnifies the internal illuminated field. Nevertheless, the trocar tube is so constructed that it will accommodate a Nitze cystoscope, if the indirect method is preferred.

Adolph Schmidt, in 1914, maintained that nothing final could be said about laparoscopy. Further experimentation was required, even though the prospects of its wide acceptance clinically were not very favorable.

Johnsson (1916) of Finland has practiced both thoracoscopy and laparoscopy, but he has tempered his praise of them by saying that the interpretation of the pictures obtained is sometimes very difficult.

Orndoff (1920) of Chicago, stated that he had experimented with abdominal endoscopy before he learned of the work of Jacobaeus. He has adopted the latter's instrument, but he executes the technical part of the procedure in front of the roentgen screen. Besides establishing the diagnosis in tuberculous peritonitis, hæmoperitoneum and extra-uterine pregnancy, the endoscopic method has proved invaluable in distinguishing ovarian cysts. Of 42 cases with such cysts, he recorded 28 in this manner. Since that time Orndoff has continued to use the method of "peritoneoscopy" as he calls it, and he can look back on a very extensive experience with it.

Tierney, in 1920, in an article on pneumoperitoneum said that Engelbach and he have tried endoscopy of the abdomen and will publish their results in another paper.

Korbsch (1921 and 1922) declared that indications for laparoscopy are afforded in all cases in which the customary diagnostic methods leave us in the dark. He proceeds in the usual manner except that he uses the puncture needle, suggested by Adolph Schmidt, in the inflation of the abdomen. This cannula is dulled and is closed at the lower end, but near this point has a lateral slit, which is not easily clogged during the perforation of the abdominal wall. Korbsch has had numerous water-color sketches made of the views obtained within the peritoneal and pleural cavities. In some instances, during the work of the artist, the endoscope remained in place from 2 to 3 hours without causing any discomfort to the patient.

Besides Kelling and Korbsch in Germany, Unverricht (1923) has had considerable experience with both thoracoscopy and laparoscopy. He asserted that the latter method would be more popular if the field portrayed by the endoscope at any one time were less circumscribed. Accordingly he had an endoscope built with a larger caliber, a stronger light and with a broader angle (60 per cent) of vision.

Zollikofer (1924) in Switzerland affirmed that laparoscopy renders its best diagnostic service in the affections of the liver. He employs carbon dioxide for the inflation of the abdomen because it is easily and very quickly absorbed. Gaseous expansion of the peritoneal cavity is harmless and tolerated only by patients in whom emptying of the ascitic fluid is possible; such distention causes reflex action of the vagus on the heart. Therefore he contends, pathological changes of the gall bladder, appendix, and adnexa as a rule will not be objects of the laparoscopic method.

Stone (1924), in Kansas, became interested in the possibility of passing a nasopharyngoscope through the abdominal wall for diagnostic purposes, and shortly afterward discovered that a similar method had been developed and used in Europe for some years. His experience was limited to experimental work on dogs. The trocar tube which he has used recently is fitted at its outer end with an open screw cap containing a rubber diaphragm or gasket. This encircles the inserted endoscope snugly and prevents the leakage of air from the abdomen during the observation.

Steiner, of Atlanta, Georgia, in a paper published in 1924, said that the title of his article, "Abdominoscopy" refers to a new method of examination. Quoting him, he "has been unable to find any papers dealing with the experimental or theoretical phases of the subject. There is nothing to indicate that it has been tried before either on the living or on the cadaver. Thus it is an entirely new diagnostic method." These statements are, to say the least, startling, in view of the rather extensive publication on the subject. Steiner's method varies little from that originally developed by Kelling, except that for a trocar sheath he uses a half tube made of thin flexible metal.

Edwards of London in 1924 published a brief illustrated report on his experience with thoracoscopy in the diagnosis and treatment of diseases of the chest.

NOMENCLATURE

It is not the writers' intention or hope to determine which of the several names that have been given to the methods of illumination and inspection of the abdominal cavity shall have precedence and should be adopted. In general such attempts prove futile. More or less chance establishes tradition; here, the usage of a name. That an accepted term may not always be explicit, or may become narrowed in its meaning, is well illustrated by the general term endoscopy, which today is commonly employed to designate the endoscopic examination of cavities in connection with the throat. None the less, the writers wish to express their preference in the choice of a term. The following names may be considered:

1. Cœlioscopy (Kelling, 1901).
2. Ventroscopy (Von Ott, 1901).
3. Laparoscopy (Jacobaeus, 1911).
4. Organoscopy (Bernheim, 1911).
5. Peritoneoscopy (Orndoff, 1920).
6. Abdominoscopy (medical dictionaries; later Steiner, 1924).
7. Celoscopy (medical dictionaries).
8. Splanchnoscopy (medical dictionaries).

Since Kelling first used the term *cœlioscopy* specifically for the method of endoscopy of the abdomen, it would seem fitting to favor it among the terms proposed. However, the prefix *cœlio*, from the Greek *koilia*, the belly, is not as familiar to the medical man as is *lapara* (flanks or loins), or the Latin derived *abdomen*. The same objection holds for *ventroscopy* and for *celoscopy*. The term *organoscopy* is not definite enough, whereas that of *peritoneoscopy* we consider too restricted, for not only does the endoscope reveal the appearance of the peritoneum but to a considerable degree also the organs covered by it. The word *splanchnoscopy*, given many years ago to a method of transillumination of the walls of the body, organ cavities, and cysts, is now reserved to denote the examination of the viscera with roentgen rays. The term *laparoscopy* is apparently destined to become the accepted standard appellation of endoscopy of the abdomen in Europe, where Jacobaeus and his followers have written extensively under that title. Even so, the writers prefer the term *abdominoscopy*.

TECHNIQUE OF ABDOMINOSCOPY AS PRACTICED BY THE WRITERS

As has been shown in the above review, the method of abdominal endoscopy developed by such authors as Jacobaeus, Nordentoft, Orndoff, Korbsch, Stone, et al, in the main agree with that first devised by Kelling. Respecting certain details of procedure, different suggestions were advanced. It is also apparent that some technical difficulties hindered the widespread adoption of abdominoscopy and were the chief cause of its abandonment by some men who had tried it. Hoping that we might contribute something toward overcoming those obstacles, experiments were carried on with several types of apparatus. The aim was to obtain a method which, in the first place was effective; in the second, easy of application; and, in the third, made it possible to employ any endoscope with which the observer is familiar.

Like Kelling, the writers soon found it to be advantageous to use an endoscope which is bent at its distal end (Fig. 1, *D*). Thereby it can function also as a retractor, pushing aside organs or parts of organs and bringing into view structures to their side or beneath them. This aid proved especially useful in the region of the liver, bile ducts, and stomach (Fig. 5).

Cannula and trocar. In making an endoscope of the angled type just indicated, the problem arose of contriving a cannula which would allow the endoscope to pass through it. This was accomplished by constructing a flexible cannula made of a thin spiral steel spring which was covered with a fine sheath of rubber (Fig. 1, *C*). The bore of the cannula is such that the tube of a cystoscope of No. 26 F. dimensions just slips through it. The outside diameter of the cannula is approximately 1 centimeter, and its length 10 centimeters. One of greater length, say 12 centimeters, should be used in cases in which the abdominal wall is obese.

A circular screw-cap adapted to a perforated rubber diaphragm (Fig. 1, *C* 1) fits on the upper or proximal end of the cannula and prevents the escape of air from the body cavity after the introduction of the endoscope.

A trocar stylet, having a sharp, bevelled point with three facets (Fig. 1, *B*), is used to

place the cannula in the abdominal wall. It is of such form and size that it will easily pierce the different tissue layers and yet, if carefully manipulated, not injure the intestines of the inflated abdomen.[1]

Endoscope. In trying out several kinds of endoscopes, the writers found that an ordinary No. 26 F. direct vision cystoscope, such as the Braasch (Fig. 1, *D*), served them the best. Orientation within the body cavity was easiest with it, because there are no lenses or prisms to magnify or reflect the image. True, a direct cystoscope has a fault in that the field of vision at any one time is small, being only about 3 centimeters in diameter. But in actual practice one soon learns to carry the impressions in the mind as the instrument is moved about. Observers who are more at home with the indirect type of cystoscope, the Brown-Buerger (Fig. 1, *E*), for example, naturally will obtain the best results with such an instrument.

Apparatus needed. The appliances necessary for the performance of abdominoscopy are relatively few in number and consist of the following: A trocar and cannula as described, a cystoscope, direct or indirect, a No. 18 spinal puncture needle (Fig. 1, *A*), a hypodermic syringe and needle, a small scalpel, and a small foot pump, rubber tubing, and connections for inflating the abdomen.

Sterilization of instruments. The rubber tubing and all instruments, except the cystoscopes, may be sterilized in the usual manner by boiling. The latter are made aseptic by keeping them for 20 minutes in a mercuric cyanide solution, having a strength of 1 to 1,000. Obviously, it is not necessary to sterilize the air pump.

Position of patient. The table used during the examination should be of such construction, and the patient so fastened to it, that any region of the body, especially the upper and lower ends, may be safely and easily raised or lowered (Fig. 3). In this way the position of the viscera may be altered and the viewing of particular structures with the endoscope facilitated.

Site of entry. The writers generally selected a point in the vicinity of the umbilicus, 3 centimeters to the right, for the passage of the trocar through the abdominal wall (Fig. 4, *B*). This is a favorable locality, not only because the viscera in the upper and the lower abdomen may be easily observed, but also because the opening into the belly is through the rectus muscle, the fibers of which contract around the cannula, preventing the leakage of air from within, and assist the closure of the wound after its withdrawal. It is hardly necessary to remark that the trocar in certain other cases may be introduced with equal advantage at other points of the ventral abdominal wall, provided the caution is heeded of avoiding the course of the deep epigastric artery and the linea alba.

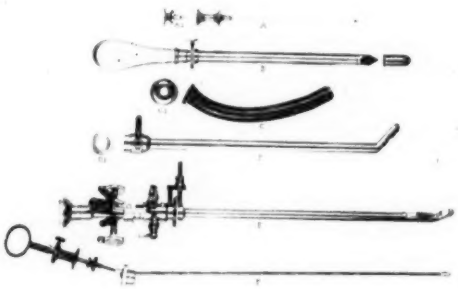

Fig. 1. Instruments used in abdominoscopy. *A*, Spinal puncture needle, *A* 1 obturator; *B*, trocar stylet; *C*, flexible trocar cannula with screw cap, *C* 1, containing perforated rubber diaphragm; D, Braasch cystoscope (direct vision), No. 26 F., with window, *D* 1; *E*, Brown-Buerger cystoscope (indirect vision); *F*, operating forceps used in cystoscopy.

At the chosen point of entry, a small bleb about 2 centimeters across is made under the skin with a 1 per cent novocain solution; the hypodermic needle is then carried by stages deeper to anæsthetize the subcutaneous tissue and the rectus fascia, and finally is brought down to the peritoneum (Fig. 4, *A*) where the subperitoneal tissue is infiltrated with approximately 2 or 3 cubic centimeters of the solution. The peritoneum being very sensitive, its thorough infiltration is required.

Pneumoperitoneum. An incision 1 centimeter long is made in the anæsthetized skin (Fig. 4, *B*). Here the spinal needle, the point of which is not too sharp, together with its obturator is pushed through the several layers

[1] Trocar and cannula made by V. Mueller & Co., Chicago.

Fig. 2. Production of pneumoperitoneum. By means of the foot bellows, air is forced through the rubber hose, the sterile cotton filter, and the spinal puncture needle into the abdominal cavity.

of the abdominal wall (Fig. 4, *C*) until the peritoneum is pierced. This is felt as a sudden release in the pressure applied. We have never found the needle to injure the bowel or the omentum. The obturator is removed from the lumen of the needle, and the sterile tube connections are joined, one end to the needle, and the other to the air pump (Fig. 2). Interposed in the rubber hose is a short glass tube of somewhat larger caliber (Fig. 2) which is filled with dry sterile cotton for filtering the air.

The next step is to pump air into the peritoneal cavity (Fig. 4, *D*) by means of the bellows, the Buffalo dental foot pump (Fig. 2) functioning in this capacity. Air was used in preference to oxygen, carbon dioxide, nitrogen, or other gases, as a medium of inflation, because it is always available. Any slight amount which might remain within the abdominal cavity after the examination is absorbed in time.

In the production of pneumoperitoneum, brief reference may be made to our experiments with dogs. We wished to determine the absorbing power of the peritoneum for air, and also what changes, if any, occurred in the composition of the air left within its cavity. Accordingly, we inflated the abdomen of 5 medium sized dogs with filtered air to the volume of 1,500 to 1,700 cubic centimeters. At intervals of several days, different dogs were deflated, and the air recovered was measured and analyzed. These experiments and the results obtained are expressed in tabular form as follows:

The table shows that the absorption of air from the peritoneal cavity proceeds relatively slowly, but at a definite rate. At the end of 5 days, approximately 35 per cent of the amount introduced had been absorbed, at the end of 7, 45 per cent, and at the end of 12 days, 65 per cent.

Regarding the composition of the air within the abdominal cavity, it will be observed from the above table that the gases, nitrogen, oxygen, and carbon dioxide, tend to establish soon equilibrium in their ratio to one another. The analysis of the room atmosphere used for inflation had the following composition: 79.12 per cent of nitrogen and 20.88 per cent of oxygen, with a trace of carbon dioxide amount-

TABLE I.—ABSORPTION OF AIR IN PNEUMOPERITONEUM

Dog No.	Weight kg.	Date of inflation	Volume inflated Cubic centimeters	Time interval Days	Volume recovered Cubic centimeters	Per cent recovered	Volume absorbed Cubic centimeters	Per cent absorbed	Analysis of air recovered		
									Nitrogen Per cent	Oxygen Per cent	Carbon dioxide Per cent
25	12.0	1-8-25	1680	5	1100	65.5	580	34.5	88.9	4.7	6.4
26	12.5	1-8-25	1510	5	940	62.2	570	37.8	88.2	6.9	4.9
27	10.8	1-8-25	1580	7	936	59.2	644	40.8	86.8	6.5	6.9
24	10.5	1-8-25	1520	7	775	51.0	745	49.0	86.3	7.3	6.4
29	11.0	1-8-25	1600	12	550	34.4	1050	65.6	86.0	5.7	8.3

ing to less than $^1/_{20}$ of 1 per cent. On the other hand, the average percentages of these gases in the air from the peritoneal cavity of the 5 dogs were 87.2 (nitrogen), 6.2 (oxygen) and 6.6 (carbon dioxide), respectively.

Before the experiments in inflation were undertaken, the writers assumed that a considerable volume of air pumped into the abdominal cavity would result in a marked increase of the intra-abdominal pressure. To their surprise, however, this did not exceed 3 to 8 millimeters of mercury, even after a liter and a half of air had been forced into the abdomen of a medium sized dog and it appeared very much distended. Unquestionably, as soon as the maximum expansion of the abdomen has been attained, continued inflation would soon register a high pressure. Not to give the animal undue pain, inflation was stopped before this point was reached. In the human it is not necessary to carry inflation even proportionately to the degree we produced in dogs. A moderate unmeasured quantity of air within the abdominal cavity is entirely sufficient to perform endoscopy successfully.

Passage of the trocar and the cannula. After enough air has been introduced into the peritoneal cavity to raise its walls some distance from the underlying bowel (Fig. 4, *D*), the spinal needle is withdrawn, and the trocar, along with its flexible cannula, is placed in the small skin incision and pushed gently through the belly wall (Fig. 4, *E*). Needless to say, it is essential while doing this to have complete control of the strength and pressure applied. In cases in which peritoneal adhesions are suspected, it is wise to execute this action in front of the fluoroscopic screen. The stylet is removed, the metal cap with rubber diaphragm (Fig. 1, *C* 1) screwed on the cannula and the endoscope passed through the latter (Fig. 4, *F*). Since most of the air escapes from the body cavity at the withdrawal of the trocar stylet, it is necessary to reinflate it through the endoscope. Then, as soon as the proper electrical connections are made with the lamp of the instrument, the examination can proceed (Fig. 3).

Endoscopic exploration. On looking through the endoscope when it is in the perpendicular position, one immediately sees the yellow omentum and its red blood vessels. By moving the instrument about, that is changing its direction or angle with the body surface, and pushing it further in or out, much of the abdominal viscera is made visible by steps. On account of the difficulties of orientation, it is important that the observer, especially the beginner, conduct his inspection in a systematic manner; in other words, proceed from structure to structure in regional order. When viewing the upper abdomen, it is well to elevate the head of the patient to 20 or 30 degrees. This causes the coils of the intestine to fall away from the liver and diaphragm and hence exposes greater areas of these organs. The gall bladder is easily identified by its

Fig. 3. Endoscopic exploration. The distal end of a Braasch cystoscope has been passed into the abdomen through the trocar cannula, and in this case the lower part of the patient has been elevated to permit an uninterrupted view of the pelvic interior.

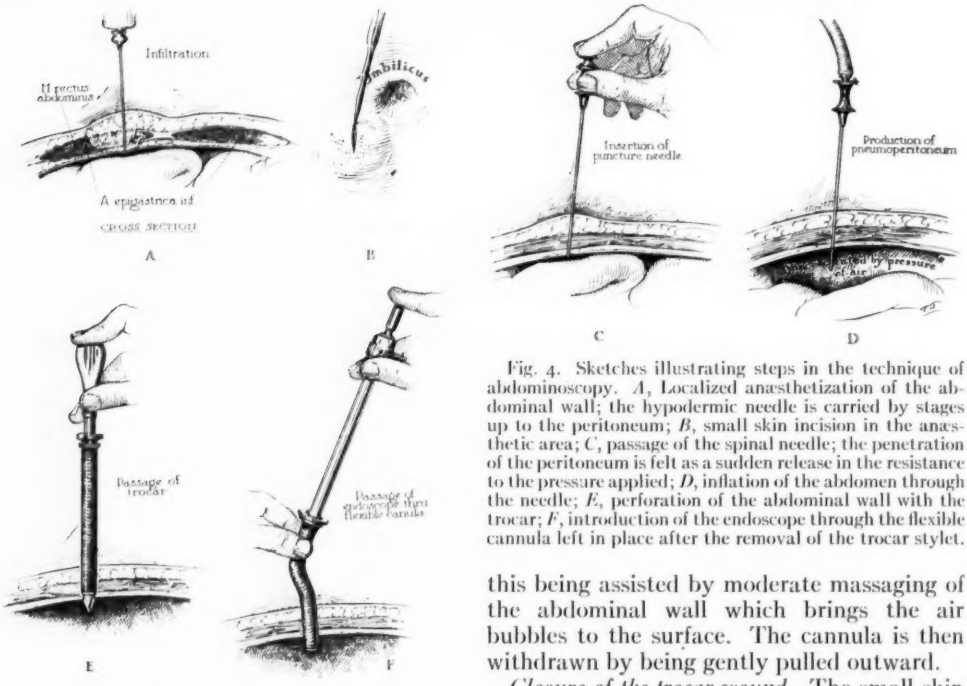

Fig. 4. Sketches illustrating steps in the technique of abdominoscopy. *A*, Localized anæsthetization of the abdominal wall; the hypodermic needle is carried by stages up to the peritoneum; *B*, small skin incision in the anæsthetic area; *C*, passage of the spinal needle; the penetration of the peritoneum is felt as a sudden release in the resistance to the pressure applied; *D*, inflation of the abdomen through the needle; *E*, perforation of the abdominal wall with the trocar; *F*, introduction of the endoscope through the flexible cannula left in place after the removal of the trocar stylet.

bluish color, and when the liver is pushed aside with the curved end of the endoscope, the cystic and common ducts are brought into view. The entire anterior surface of the stomach can be inspected; similarly, the first portion of the duodenum.

After the position of the patient is changed by raising the inferior part of his body to an angle of 20 degrees with the floor, the lower abdomen and pelvis can be explored. Such organs as the uterus, tubes, ovaries, urinary bladder, and sigmoid colon are clearly recognized, likewise the appendix, provided it is not retrocæcal or hidden by adhesions.

As suggested by Orndoff, in some cases advantage may be derived from inserting a second cystoscope in the bladder and observing the transillumination of its wall. At other times, it will be found instructive to carry out bimanual palpation of the pelvic organs during the endoscopic examination.

Removal of the cannula. On the removal of the endoscope, the air contained in the abdomen is allowed to escape through the cannula, this being assisted by moderate massaging of the abdominal wall which brings the air bubbles to the surface. The cannula is then withdrawn by being gently pulled outward.

Closure of the trocar wound. The small skin incision is closed by a piece of adhesive tape about 1 centimeter wide and 5 centimeters long. This tape may be removed on the fifth day.

OBSERVATIONS AND CONCLUSIONS

Abdominoscopy on dogs was carried out many times by the writers. One objective was to determine the different possible effects resulting from the trocar puncture; another was to find the best site of entry. Relative to the latter, we learned, as has already been indicated and the reason explained, that a perforation of the rectus abdominis muscle is more favorable than one made in mid-line.

At the end of one of the examinations, when the cannula was being removed from the dog's abdomen, a small fold of omentum was accidentally pulled out through the wound. Six weeks later during autopsy of the dog, it was found that we had not been entirely successful in pushing back the omental fold through the aperture and a peritoneal adhesion had formed. Such an accident could hardly occur in the

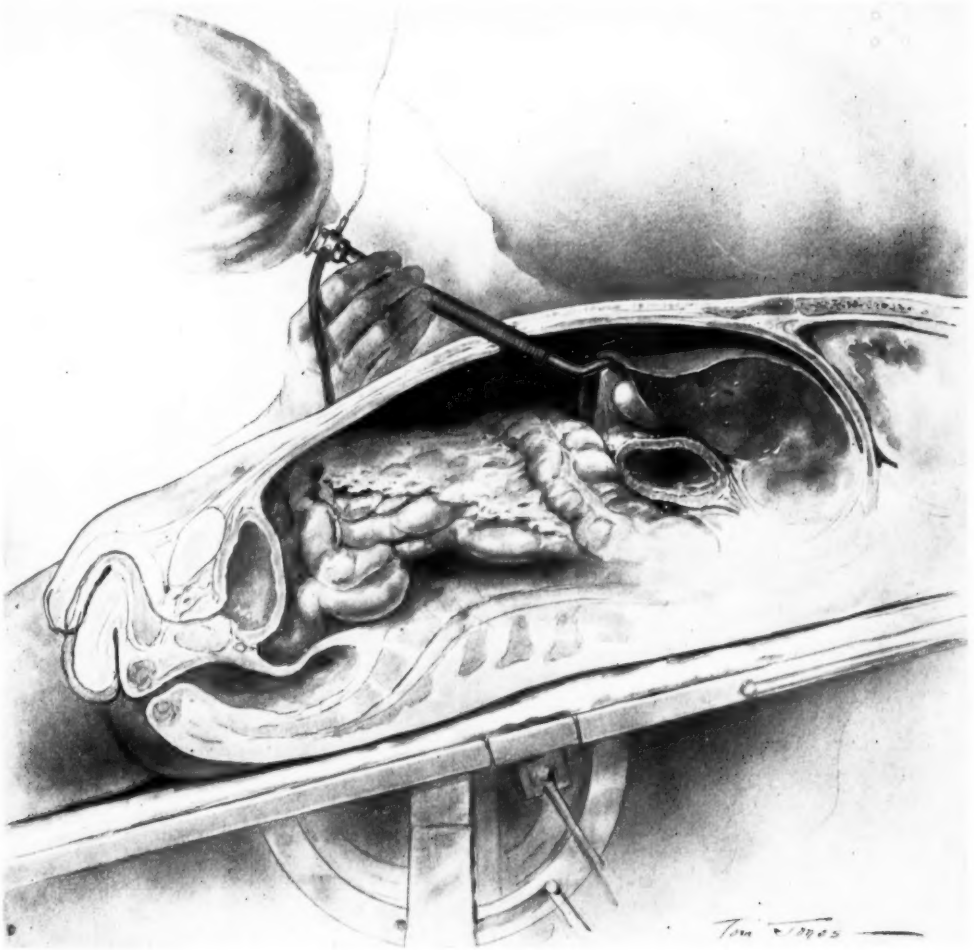

Fig. 5. Abdominoscopy.

human, where the omentum is thick as compared with the thin veil-like one of the dog.

The adhesion, just mentioned, was the only one that had developed after the use of the method. As the autopsies showed, the puncture wounds had healed so perfectly that it was sometimes difficult to find the scar on the peritoneal surface. At most, the margins of the scars were slightly puckered.

Repeated abdominoscopic exploration on the same dog failed to produce peritonitis, or any accumulation of peritoneal fluid. Nor, at any time was it found that the trocar and the endoscope had damaged the viscera.

Abdominoscopy was done on 3 patients. True, this does not represent an extensive clinical experience, but the results obtained surpassed the expectations of the writers, and confirmed the statements made by previous investigators regarding its value in diagnosis. This function of the method, and the indications and contra-indications to it, are illustrated in the following reports of the cases examined.

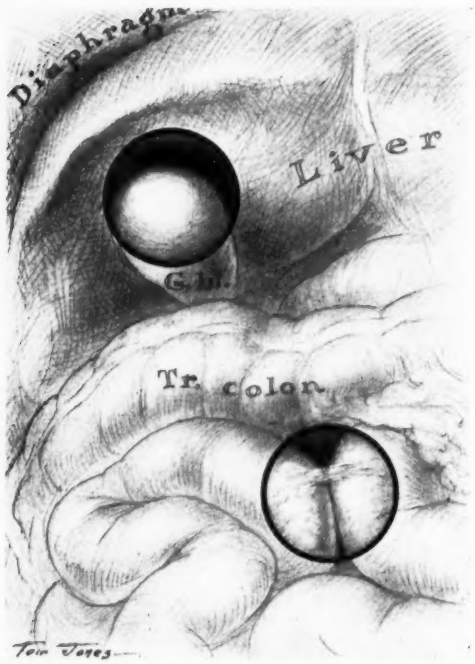

Fig. 6. Diagram illustrating two views obtained with the direct cystoscope. The upper encircled field represents the seen portion of the fundus of the gall bladder and the neighboring liver, and the lower, the parts of adjacent intestinal loops adherent by delicate adhesions, as seen in the case of tuberculous peritonitis, described in the text.

CASE 1. The patient was a woman, 47 years of age, who had undergone three laparotomies, one for the removal of the appendix and gall bladder, a second one for gastro-enterostomy, and a third for the separation of adhesions. With the fluoroscope an area was found in the left side of the abdomen apparently free from adhesions. Here the trocar and endoscope were introduced. Upon observation, it was discovered that the endoscope projected into a small peritoneal cavity almost completely walled off by adhesions. Some of the coils of the intestines were plainly visible, even though joined together by delicate strands. Peristalsis too was seen and seemed exaggerated. Because it was impossible to find an outlet from the peritoneal cul-de-sac into the remainder of the abdominal cavity, the endoscope was removed.

Except for verifying the presence of extensive adhesions, abdominoscopy in this case was a useless procedure. The adhesions had demonstrated that when they are abundant or widespread, endoscopic exploration is contraindicated. Indeed, in this case, we judge ourselves fortunate no damage was done.

CASE 2. Here was a case of carcinoma of the stomach concerning which it was desired to know whether or not it was operable. The patient, a man, 53 years of age had always been in good health up to 5 months before admission to Augustana Hospital. Previous to that period he had had no gastric disturbances of any kind. At the onset he noticed a waning appetite and a gradual loss of weight, so that when he entered the hospital this amounted to 20 pounds below normal. Pain appeared a week before admission. During the past 2 weeks he had found that solid food did not agree with him, though he did not vomit, and in order to avoid distress he took only liquid food.

During the physical examination, a freely movable tumor, the size of half a small orange, was felt in the epigastrium. Palpation did not evoke tenderness. No other masses were detected, and there was no adenopathy throughout the body. Rectal examination was negative. A roentgen examination of the stomach revealed a filling defect in the region of the tumor, the defect being situated in the lesser curvature just proximal to the pylorus. The latter was open and emptied freely. Peristalsis was moderate.

Instead of an exploratory laparotomy, abdominoscopy was done. With the instrument pointed toward the epigastrium, a rounded pale mass no larger than a marble was discovered in the wall of the transverse colon. With the instrument still further forward, a rather sharply defined area became visible in the lesser curvature of the stomach. This area measured approximately 6 centimeters in diameter, was pink in color, and had raised borders and a center that appeared depressed and puckered. Using the curved end of the endoscope as a probe or palpator, we found the mass hard and firm to the touch, the center being softer than the peripheral portion. Four or 5 nodules, varying in size from 1 to 2.5 centimeters, oval in shape, and pearly white in color, were present in the lesser omentum. Evidently they were extensions of the primary tumor.

Because the diaphragm and the liver were separated by the air space, most of their surfaces could be scanned, especially after the head of the table had been tilted upward to an angle of 20 degrees. The face of the liver was bluish pink in color and its margins were more rounded than is normal, the liver apparently being somewhat enlarged. Imbedded in the liver, just superior to the gall bladder, a round grayish mass was found 3 centimeters in diameter and in appearance similar to the nodules in the lesser omentum. To the left of the gall bladder, but on the inferior side of the liver, a second and larger mass occurred.

The gall bladder was bluish gray in color, was moderately distended, and could be partially emptied when pressed upon with the endoscope. With the curved end of this instrument the gall bladder was lifted vertically so as to expose the cystic duct. By

hooking the endoscope under the cystic duct, it was stretched to bring into view the common duct and the junction of the hepatic with it. Just to the left of the common duct, near its middle, another metastasis was seen.

The omentum was pushed aside to uncover the small intestines. Here, in the mesentery of the jejunum, were numerous metastatic nodules for the most part smaller than those described above. It was interesting too to see the white lacteals which were prominent in the mesentery, for the patient had eaten not long before the examination.

Throughout the endoscopic observation, the patient manifested much interest in the remarks made by us, so that we were compelled to express our findings surreptitiously. He evinced neither pain nor discomfort, except once when the air pressure within the abdomen became too high and he complained of shortness of breath and substernal distress. Immediate relief was given by allowing some of the air to escape.

It is quite obvious that in this case the endoscope demonstrated the utter hopelessness of an operation for the removal of the tumor.

CASE 3. An Italian laborer, 52 years of age, entered Augustana Hospital on February 17, 1925. His chief complaint was a pain in the epigastrium and beneath the sternum. He stated that recently he had lost rapidly in weight, this having dropped from 135 to approximately 100 pounds. He was well until 4 months ago, when he felt a sharp, cutting pain, lasting but a few moments, in the upper abdomen and a little to the left of the mid-line. This pain recurred two or three times every day, and apparently stood in no relation to the intake of food. He has gradually grown very weak. During the 4 months he has been sweating profusely, but he denies having a chronic cough. He stopped working 2½ months ago, and has been in bed for 2 months. His appetite has disappeared; when he did take food he had the feeling that it became lodged behind the sternum. The pains arose more frequently and might appear at any time of the day or night. Constipation began with the onset of the first symptoms; he often went several days without a bowel movement. The stools were light yellow.

Regarding his past history, he stated that he had had malaria as a child in Italy. He is married and his wife is living, but they have had no children. No family history of tuberculosis or of carcinoma could be elicited.

Physical examination revealed a man with a facial expression of pain, a body much emaciated, and a skin dusky, sallow, and apparently icteric. He had carious teeth and a foul breath. The chest was narrow and it was sunken at the sternum. There was a slightly impaired percussion note over the entire chest and an increased fremitus, excepting over the left lower lobe of the lung, where it was diminished. Few râles were scattered over both lungs posteriorly. The abdomen was flat and the muscles were moderately tense. On palpation the patient complained of marked tenderness over the epigastrium, especially toward the left.

The examination of the blood showed 3,600,000 red cells, a hæmoglobin of 62 per cent, and 6,500 white cells. Lymphocytes constituted 45, neutrophiles 48, and eosinophiles 6 per cent of the total number of leucocytes. The urine proved negative except that it was highly concentrated. A specimen of sputum was sent to the laboratory.

In front of the roentgen screen, the barium meal was seen entering the cardia without obstruction. But the pylorus seemed narrowed and no barium passed through it during the first 20 minutes. There was retention over 6 hours. On the greater curvature near the pylorus, a filling defect was detected which persisted during fluoroscopy and appeared on the photographic film.

On the basis of the above signs, the clinical diagnosis of carcinoma of the stomach and pyloric obstruction was made, besides that of a possible pulmonary tuberculosis.

On February 26, abdominoscopy was performed to determine the operability of the gastric tumor. The omentum, the first structure seen, was thin but unusually red in color. The blood vessels over the coils of small intestine, too, were injected. We gained the general impression of the existence of a moderate inflammatory reaction throughout the abdominal cavity. Upon minute inspection, numerous small white masses, averaging 1 millimeter, or less, in diameter, and each surrounded by a narrow zone of dull red color, were found scattered over the peritoneum. In the upper abdomen, especially over the liver and diaphragm, conglomerate masses of the same lesions occurred. Between the loops of the small intestines stretched many veil-like adhesions (Fig. 6). A small quantity of slightly cloudy fluid collected in both flanks after retraction of the intestines.

The walls of the stomach, which, according to the roentgen picture, possibly contained a tumor mass near the pyloric region, were found by palpation with the endoscope to be soft. No evidence of such a lesion was observed. Whether or not the dorsal surface differed, we are unable to say because that side is not accessible to the endoscope. The gall bladder was not distended and was emptied by pressure of the instrument upon it. Active peristalsis was visible in both the stomach and jejunum.

The abdominoscopic findings led to the diagnosis of a miliary tuberculous peritonitis. Several hours later the laboratory report informed us of the presence of many tubercle bacilli in the sputum. Accordingly, we were justified in making the final diagnosis of a general miliary tuberculosis.

The case, just considered, illustrates strikingly the efficacy of the abdominoscopic method, for here the clinical diagnosis of car-

cinoma of the stomach was made on good grounds, we believe, and yet failed of substantiation because of entirely different evidence revealed by the endoscope.

In conclusion, a statement is warranted respecting the future of abdominoscopy and the circumstances that will probably govern its course. Obviously, the primary difficulties of the method lie in the orientation with the endoscope, in the circumscribed field which it makes visible at any one time, and in the interpretation of the things seen. To meet the objections which have been brought against the method, it is necessary to emphasize that if it is to produce results, the observer must have the following qualifications: practical familiarity with cystoscopic examination, an accurate knowledge of the topography of the abdominal viscera, and the training to recognize the distinctions of gross and surface appearances of pathological lesions of those organs. Hence, it is evident that abdominoscopy will not be successful in the hands of every practitioner, but must be reserved for the specialist, such as the cystoscopist and the diagnostician.

In spite of the limitations pointed out, we cannot agree with Jacobaeus when he says, "Abdominoscopy does not have the practical possibilities that thoracoscopy has." On the contrary, we are convinced it will outstrip thoracoscopy in the extent of its application and in its development. As a diagnostic method it has already proved its worth many times. From a perusal of the literature, we know that the reported cases of abdominoscopy on humans number at least 200. But not only in diagnosis, in treatment as well, will this method achieve favor, just as the cystoscope, the bronchoscope, and the thoracoscope have extended their domain of action to include operative procedure. The separation of certain types of peritoneal adhesions, the internal application of drugs, or the execution of other therapeutic measures with the guidance of the endoscope, represent the direction which the further clinical development of the method probably will take.

Aside from its clinical importance, the method of abdominoscopy will, in the future, be utilized more widely, we believe, as a technical aid in certain kinds of animal experimentation. Such physiological problems as peristalsis, peritoneal absorption, the flow of chyle, sympathetic nerve reactions, the cyclic changes of the ovary, et cetera, are revealed to the eye under more normal conditions, and those not yet solved will perhaps be brought nearer solution. Moreover, in experimental surgical work within the body cavities of animals, the endoscope in many cases will permit the investigator to trace step by step the postoperative changes in the lesions which he has set, without finding it necessary to resort to a more extensive second laparotomy, not to mention a postmortem examination. Finally, in the course of abdominoscopic inspection of human patients for diagnostic purposes, some physiological observations can now and then be made incidentally which may prove of great practical value. We have in mind particularly the aid which the fully awake patient can give in the study of visceral pain and sensations, their localization or reference, and the sympathetic reflexes and reactions when exactly known localities of the different viscera are touched or stimulated in diverse ways.

At the conclusion of this paper we wish to express our indebtedness to the late Dr. A. J. Ochsner, at whose suggestion this work was undertaken.

SUMMARY

1. Abdominoscopy represents the endoscopic method of examining the abdominal cavity, a method which is not utilized as much as it deserves.

2. Such endoscopy, if carefully executed, is a relatively simple and safe procedure.

3. Originally devised and applied by Kelling, some 25 years ago, the method in its technical details has been but slightly modified by subsequent work. At least 25 investigators or observers have published work concerning it.

4. The technique as described consists in producing a preliminary pneumoperitoneum, passing a trocar through the locally anæsthetized abdominal wall, and on its withdrawal leaving in place a flexible and air-tight sheath. This cannula then permits the introduction of any type of cystoscope preferred by the ob-

server—an instrument either straight or curved, and adapted for either direct or indirect vision.

5. With the cystoscope, an excellent view may be obtained of the interior of the abdomen, particularly in the region of the stomach, liver and bile tracts, and in the pelvic region.

6. The kinds of operative or therapeutic measures performed with the guidance of the cystoscope in the urinary bladder may also be carried out in the abdomen.

7. In some cases peritoneal adhesions form the chief drawback to the employment of abdominoscopy.

8. The diagnostician using the method must be familiar with cystoscopy, and with the normal and pathological topography of the abdomen.

9. The writers, convinced of the great practical possibilities inherent in this method, recommend its wider use in clinical as well as in experimental work.

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DIABETES IN SURGICAL PATIENTS WITH ESPECIAL REFERENCE TO INSULIN[1]

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THE diabetic patient with surgical complications requires more medical attention than does the patient without such complications. Diets are revised more frequently not only with regard to composition, but also with respect to physical state and digestibility. This is especially true during the days immediately following an operation or when vomiting, hiccough, or fever occur. The dose of insulin has to be changed more often because of rapid development of hyperglycæmia and acidosis or inability to consume a prescribed diet on account of anorexia, nausea, or vomiting. Again, after operation, digitalis is more frequently required to support the circulation so that the urine output does not decrease sufficiently to interfere with the elimination of acetone bodies or urea. Finally, the administration of fluids by vein, hypodermatically, or by rectum must be resorted to more often than in uncomplicated diabetes.

Not many years ago operations on diabetic patients were approached with considerable anxiety. Relatively short surgical procedures were often followed by rapid production of ketone bodies resulting in coma and death. At present with insulin and medical supervision, the operative risk in diabetic patients does not appear to be greater than in the non-diabetic. Thus, in a recent article, Allen states that "thorough dietary preparation is advisable when possible and makes operation on diabetic patients practically as safe as on the non-diabetic. America has reversed the old European rule that surgery on patients with diabetes should be avoided as far as possible." Wilder and Adams (9) state that the operation mortality in diabetes at the Mayo Clinic had been about 7 per cent but that during the past 2 years 327 operations were performed on 251 diabetic patients with only 1.2 per cent of deaths. The authors believe that the reduction in mortality is due to the assistance of the internist who has become a part of the surgical team. Obviously their clinical material differs somewhat from that encountered in the emergency wards of metropolitan hospitals. Foster (5) reports a death rate of 12 per cent at the New York Hospital during the first year following the introduction of insulin as compared with a 40 per cent mortality for the decade preceding.

Even slight absorption from infected tissue may have a marked adverse effect on the utilization of glucose by the diabetic organism. The exact explanation for this phenomenon is still outstanding. Whether an influence is exercised on the cells of the Langerhans islands resulting in a decreased production of insulin, whether the mechanism of insulin action is interfered with or whether the mobilization of glycogen is accelerated has not been definitely established. Insulin may often be omitted when absorption from an infected area has subsided. Rabinowitch (7) found that in gangrene or infection there was a delay or absence of the rapid fall in blood sugar which usually follows the injection of insulin in uncomplicated diabetic patients.

With regard to energy requirements, it may be said that patients who are to remain in the hospital for a short time or who are overweight, receive 1,500 to 2,000 calories, otherwise 2,000 to 3,000 may be required.

The dose and frequency of insulin administration varies with the diet, degree of acidosis and hyperglycæmia. The time of insulin administration has usually been one-half hour before meals; the larger doses being given before breakfast and supper.

Instances of apparent psychical or emotional glycosuria are observed after severe injuries. The exact mechanism of this transient glycosuria which may occur in an otherwise normal person is not clear. The following cases are illustrative.

[1] Read before the New York Physicians' Association, April 22, 1925.

J. C., 34 years of age, history number 58,320, suffered an automobile accident resulting in fractures of the radius and scapula, and skin injuries. He excreted considerable sugar on the day of admission, only a trace the next day, and none on the third day. No blood estimation was made. No anæsthetic was administered. There was no previous history of diabetes.

S. B., 6 years of age, history number 56,848, was thrown by a truck. On admission, April 21, 1923, he appeared to be in shock, somewhat dyspnœic and cyanosed. He had a greenstick fracture of the left clavicle, a lacerated wound of the left arm and rupture of the right lung, with pneumothorax. The urine on April 22 contained considerable sugar; on the second day it contained less sugar but considerable acetone and diacetic acid; on the third day it was sugar free. Patient gave normal reaction to a glucose tolerance test on May 7, 1923. No anæsthetic was used.

S. P., 29 years of age, history number 57,503, sustained a fracture of the ilium and rupture of the acromioclavicular ligament as a result of a motor cycle accident. The urine on admission contained considerable sugar. The next day the urine was sugar free and the blood sugar 0.13 per cent. On the third day after admission the blood sugar was 0.10 per cent. No anæsthetic was used.

H. C., 12 years of age, history number 59,284, was admitted on February 25, 1924, for rupture of the liver and hæmorrhage into the peritoneal cavity following a coasting accident. Laparotomy was done under ethylene anæsthesia on February 26. She excreted sugar for 4 days after the accident. The blood sugar on February 26 was 0.10 per cent.

The above data are not sufficient to permit a definite conclusion regarding the mechanism of the glycosuria. The patients were too sick for extensive studies of the blood. The 24-hour specimens of urine could not be obtained.

Lactating women who are compelled to stop nursing on account of a surgical emergency may excrete urine which reduces alkaline copper solution. This is obviously due to lactose which is reabsorbed into the blood from the overdistended mammary gland and excreted in the urine. There is apparently no ferment in the blood or tissues which can hydrolyze this sugar into its components, glucose and galactose. This disaccharide may be differentiated from glucose as it is not fermented by ordinary yeast and forms mucic acid when oxidized with nitric acid.

Regarding the incidence of diabetes before, during, or after pancreatitis, it is noteworthy that of 48 verified cases at the Presbyterian Hospital, diabetes occurred in only 3.

Ether anæsthesia is apt to be followed by vomiting; it lowers the bicarbonate content of the blood, and raises the sugar in normal individuals and should therefore be used as sparingly as possible in diabetes. Local anæsthesia with novocain is preferable if it enables the surgeon to carry out the operation satisfactorily without inflicting too much pain. One is astonished at the amount of manipulation that can be done without distress to the patient. When more relaxation is required, nitrous oxide is preferable to ether, because it has less effect on blood sugar and bicarbonate and is less apt to produce vomiting. The recently proposed ethylene seems to have little effect on blood sugar and alkali in non-diabetic individuals. The effect is more pronounced in diabetic subjects.

Table I records the effect of various anæsthetics on the blood sugar and bicarbonate of non-diabetic patients. The action of ethylene on the blood of diabetics is based on studies of 3 patients, a totally inadequate number, but the figures are at least suggestive.

In abdominal operations ether may be necessary to procure relaxation but it should be used as sparingly as possible.

THE SURGICAL COMPLICATIONS OF DIABETES

The surgical complications of diabetes may be divided into two main groups; those more or less characteristic of the disease (that is, carbuncle and gangrene) and those which are purely accidental. For practical purposes the latter may be subdivided into conditions that require immediate operation and those for which operation may be deferred.

Carbuncle (cellulitis and abscess). Between January, 1918, and July, 1924, a period of 6½ years, 39 diabetic patients were operated on for the infections mentioned: Of these 13 had true carbuncle. Ten of the 13 deaths which occurred in this group were due to bacteræmia and of these 4 followed carbuncle. Hæmolytic staphylococcus aureus was found in the blood of 9 patients and the non-hæmolytic staphylococcus albus in one.

Diabetic patients appear to be more susceptible to pyogenic infections and their

TABLE I.—AVERAGE CHANGE IN BLOOD SUGAR AND BICARBONATE FOLLOWING NITROUS OXIDE AND ETHER, NITROUS OXIDE ALONE, AND ETHYLENE

Authors	Number of Patients	Increase in blood sugar per cent	Decrease in bicarbonate volumes per cent	Anæsthetic
Epstein and Aschner (3)	65	.046		Nitrous oxide and ether.
Epstein and Aschner (3)	65	.043		Nitrous oxide and ether.
Epstein, Reiss and Branower (4)	12	.076		Nitrous oxide and ether.
Morriss (6)	10		8.8	Nitrous oxide and ether.
Caldwell and Cleveland (2)	42		6.1	Nitrous oxide and ether.
Caldwell and Cleveland (2)	14		4.1	Nitrous oxide.
Epstein and Aschner (3)	5	.025		Nitrous oxide.
Bauman	7	.028	2.0	Ethylene.
Bauman	3	.075	4.1	Ethylene in diabetics.

tissues seem to be less resistant to the spread of infection once it is established. Extensive infection and suppuration may be unaccompanied by corresponding local or general signs or symptoms. Carbuncles may become dangerous on account of accompanying acidosis or because of spread of infection to adjacent tissues or to the blood stream. In mild diabetic patients bacteræmia may occur without hyperglycæmia or acidosis. It is usually a fatal complication which is accompanied by multiple abscesses, some of which are characteristically located in the lungs. It remains to be seen whether the chemotherapeutic measures recently advocated will sterilize the blood of these patients.

The increased severity of the diabetes which practically always results from an infection, may manifest itself by elevation of the blood sugar, with or without acidosis. Acidosis may be prevented or counteracted in most cases by giving 500 milliliters of 5 per cent glucose containing 25 units of insulin hypodermically every 4 to 6 hours. Of course, the glucose may also be given by mouth as orange juice (which is practically a 10 per cent sugar solution) or it may be given by rectum or by vein. Early drainage of the infected area is desirable, for even with insulin it may be difficult or impossible to control the diabetic condition in the presence of a severe infection.

After operation the bicarbonate of the blood can usually be restored to a level which is no longer alarming by continuing the glucose and insulin treatment. If the blood alkali remain low in spite of this treatment, then sodium bicarbonate may be given intravenously or by rectum in 2 to 3 per cent solution. Overalkalinization, which may injure the kidneys and nervous system, can be avoided by control of the reaction of the urine and estimation of the bicarbonate content of the blood.

The effect of treatment is best observed by examining each voiding of urine for sugar, diacetic acid, and reaction. This is easily accomplished even in private practice with the help of a few pyrex test tubes, a "sterno" lamp, ferric chloride, Benedict's qualitative solutions, and litmus paper. A few drops of urine suffice for each determination so that the collection of the 24-hour amount is hardly interfered with. Obviously this routine is all the more important when large doses of insulin are required. Hypoglycæmia may have serious effect on a patient already weakened by disease and operation. An amount of insulin which is necessary at one time may become excessive at another when absorption from an infected area is suddenly diminished. Hypoglycæmia may also result if food is withheld for too long a time after the administration of insulin on account of anorexia, nausea, vomiting, or through error. The so-called insulin or hypoglycæmic shock is easily relieved by the administration of sugar by mouth or hypodermically. The daily fluid intake is held between 2 and 4 liters by administering orange juice, water, bouillon,

TABLE II.— SHOWING THE EFFECT OF PNEUMONIA, BACTERÆMIA AND GANGRENOUS CELLULITIS ON THE CARBOHYDRATE METABOLISM OF A MILD CASE OF DIABETES

Date	Diet			Fluid intake mls.	Urine sugar gm. p. d.	Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.			Sug. %	Bicarb. vols. %	
Jan. 22					*8.14%	.46	68	Admission specimens.
Jan. 22–23	60	15	15		27.6			Max. temp. 104°.
Jan. 23–24	60	15	15	2750	15.7			Max. temp. 102°.
Jan. 24–25	60	15	15	2800	11.2	.33	66	Max. temp. 101.6°.
Jan. 25–26	60	15	15	2100	5.3			Max. temp. 99.8°.
Jan. 26–27	30	30	30	3200	+			Max. temp. 101.4°.
Jan. 27–28	30	30	30	2900	0			Max. temp. 102.4°.
Jan. 28–29	30	30	30	2400	0	.11	45	Max. temp. 101.8°.
Jan. 29–30	30	40	40	2800	0			Max. temp. 102.4°.
Feb. 3–4	30	40	40		0	.12	68	Operation N_2O 30 minutes.
Feb. 5–6	30	40	40	2600	0	.14	66	Max. temp. 102°.
Feb. 10–11	30	40	40	4000	0	.12	65	Operation N_2O 37 minutes.
Feb. 11–12	30	40	40	4000	0	.12	65	Max. temp. 100.8°.
Feb. 18–19	40	50	100	3300	0			Max. temp. 102.6°.
Feb. 20–21					0			Operation N_2O 45 minutes.
Feb. 24–25	40	50	100	1700	0	.10		Max. temp. 102°.
Feb. 26–27	70	50	200		0			Max. temp. 99.2°.
Mar. 8–9	100	60	200		0	.11		Max. temp. 99.4°.
May 8–9	100	60	150		0			Max. temp. 98.6°.

*Only figure in column expressed as percentage.

tea, and coffee by mouth. If necessary 0.9 per cent saline solution may be given under the skin, by rectum, or intravenously, in addition to the glucose solution. Often anything but water by mouth may be undesirable for several days after operation.

Acidosis usually subsides within 24 to 48 hours. The further dietary measures and insulin treatment are similar to those employed in uncomplicated diabetes.

Since the advent of insulin, it is not uncommon to find more sugar in the blood and urine before breakfast than at any other period during the 24 hours. This is obviously due to the relatively long interval between the evening and morning doses of the hormone. It can be corrected by increasing the evening dose, by giving it later or by giving a second dose at about 10 p.m.

Several days before discharge from the hospital, the patient or person responsible for the preparation of the diet is instructed in the selection and calculation of the food requirements, the examination of the urine for sugar and diacetic acid, and the injection of insulin, if that is necessary. Medical and surgical observation is continued in the outpatient department of the hospital.

These infections usually occur in patients who have not given sufficient attention to their diet; their serious nature and prolonged course with the resulting loss of time, serve to impress the patient with the need of cooperation and periodic medical examination.

Gangrene. During the past 6½ years 23 diabetic patients with gangrene were admitted to the surgical wards. Of these 17 were operated on, with 2 deaths, a mortality of 12 per cent, which compares favorably with the statistics of several other eastern clinics.

Gangrene is nearly always limited to the lower extremities and usually begins in the toes. In almost every instance arterial changes are present which result in decreased or absent pulsation of the arteries of the foot. If the arteriosclerosis is sufficiently advanced

TABLE III.—SHOWING GRADUAL IMPROVEMENT IN CARBOHYDRATE METABOLISM DURING THE HEALING OF AN INFECTED WOUND

Date	Diet			Insulin units	Fluid intake mls.	Urine* sugar in 24 hr. gm.	Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.				Sug. %	Bicarb. vols. %	
April 9–16	70	60	150	30		0	.15	50	
April 16–17	70	60	150	30		2.8			
April 17–18	70	60	150	45		5.7			
April 18–19	50			60		+++			Operation. Glucose subcutaneously. Orange juice by mouth.
April 19–20	50			50	1450	10.8	.29	57	Orange juice by mouth.
April 20–21	62			45	2050	3.1	.28	50	Vomiting, hiccough. Glucose per rectum.
April 21–22	75			60	3115	7.6			Glucose per rectum.
April 22–23	125			120	2700	8.6	.082		Glucose subcutaneously and per rectum. Double amount of insulin by mistake.
April 23–24	60	60	60	0	1250	2.0	.20		
April 24–25	154			50	2020	lost			Cereal by mouth. Glucose per rectum.
April 25–26	?			40	1530	8.3			Vomiting.
April 26–27	144	20	4	40		6.1			Gruel, orange juice, toast.
April 27–28	56	16	10	40		6.8			
April 28–29	60	60	60	40		6.1			Regular diabetic diet.
April 29–30	60	60	60	40		0			
April 30–1	60	60	60	40		0	.24		
April 1–2	60	60	125	40		0			
April 2–3	60	60	125	40		0			
Aug. 15–16	80	80	150	10		0	.13		

*Diacetic acid never appeared in urine.

the roentgenogram of the leg may show linear shadows indicative of calcium deposits in the blood vessels.

Prolonged hyperglycæmia is probably responsible or aggravates the arterial changes, though this causal relationship has never been conclusively established by experiment. Premonitory symptoms and signs of impending gangrene are undue coldness of the feet, pain on walking, or during the night when the circulation is at a low ebb, numbness and discoloration of the toes. At this stage benefit may be obtained (usually only after a period of months) by the following measures; rest (partial or complete), the application of dry heat, exercises as advocated by Buerger (1), massage and restriction of diet with or without insulin, according to the severity of the diabetes. Diminished food consumption reduces blood sugar and lowers body weight, thus lessening the burden on the lower extremities. Joslin advocates extreme cleanliness and avoiding abrasions and pressure on the feet. As the sensation in the affected limb is often impaired, care must be exercised in the application of heat. An infected blister due to a burn may be the "last straw" that precipitates the dreaded complication. A safe warm air chamber is improvised by introducing an electric bulb into a space provided by raising the bed clothes over curved flexible wooden splints inserted within the sides of the bed.

Gangrene is most frequently observed in mild diabetics and may occur with only a moderate elevation of blood sugar (for example between 0.15 and 0.2 per cent) and without glycosuria or symptoms suggesting diabetes. This is one reason for urging periodic medical examinations especially of the urine and blood. Occasionally one finds the blood sugar elevated to 3 or 4 times the normal amount, with no sugar in the urine. Seelig (8) reports such a patient who de-

TABLE IV.—ACUTE APPENDICITIS AND APPENDICECTOMY IN A FAIRLY SEVERE CASE OF JUVENILE DIABETES

Date 1924	Diet			Insulin units	Fluid intake mls.	Urine		Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.			Sug. gm.	Diac.	Sug. %	Bicarb. vols. %	
Mar. 28–29	75*			45	1900	2.2	++	.29	26	Operated upon eve. Mar. 27.
Mar. 29–30	75*			70	2500	32.	0	.36	26	Vomiting.
Mar. 30–31	75*			60	2500	21.8	0	.32	25	Vomiting.
Mar. 31–1	50	50	100	75	3200		++	.35	63	8 gm. sod. bicarb. p. r.
Apr. 1–2	50	50	100	40	3600	25.0	0	.27	58	5 feedings †
Apr. 2–3	50	50	150	65	4100	9.4	0	.25	54	
Apr. 3–4	50	50	150	70	4150	6.8	0	.24	44	
Apr. 4–5	50	50	150	60	2550	tr.	0	.22	46	
Apr. 5–6	50	50	150	50	2350	3.3	0			
Apr. 6–7	50	50	150	50	2350	4.8	0			Regular diabetic diet.
Apr. 7–8	50	50	150	50	2700	0	0			
Apr. 8–9	50	50	150	50	2450	0	0	.18	51	
Apr. 9–10	50	50	150	50	2200	0	0	.26	53	
Apr. 13–14	50	50	150	50	2150	0	0	.17		

*Glucose hypodermatically.

†Feedings consisted of milk, orange juice, eggs, and milk toast.

veloped diabetic coma after colostomy under local anæsthesia. This author also advocates the use of glucose and insulin as a prophylactic measure before operation.

Usually death and marked discoloration of the tissues have occurred when the patient seeks hospital care. Mortification may be slow, the gangrenous area circumscribed, dry, even mummified, or it may be rapid with extensive infection as evidenced by fever, swelling, redness, tenderness, inflamed lymphatics extending up the leg, and painful enlarged inguinal nodes, associated with hyperglycæmia, glycosuria, and acidosis. In the latter case, early amputation is usually required.

Occasionally patients with heart weakness develop thrombosis of the larger arteries with loss of blood supply to the entire leg in a relatively short time. The surgeon may have difficulty in selecting the optimum site of removal. Usually the question arises whether to amputate above or below the knee joint. The important criteria are age, economic status, likelihood of viability of the stump, and presence of bacteria at the site of amputation. The blood supply of the tissues at the level of amputation may be impoverished, as a result of disease of the smaller vessels even though there is good pulsation in the popliteal and femoral arteries. The stump often becomes infected in spite of precautions, or is allowed to heal by granulation from the outset. This is a notoriously slow process in diabetic patients. A second operation consisting in loosening of the flaps, and the application of traction may be necessary to enclose the end of the bone and secure proper healing.

In infected cases, acidosis may become alarming so that glucose and insulin may be required before operation. After operation from 600 to 1,000 milliliters of orange juice may be administered during the course of the day. If nausea or vomiting are present, 250 milliliters of 5 per cent glucose solution may be given by rectum every 3 to 4 hours. The total volume of fluids range between 2 and 4,000 milliliters per day, depending on age, condition of the circulation, and the degree of acidosis. Insulin, if required, can be given ½ hour before each sugar administration.

As soon as acidosis, nausea and vomiting have subsided, cereals, toast, soft cooked eggs, milk and junket are added. Later the

TABLE V.—ILLUSTRATING THE USE OF GLUCOSE AND INSULIN TO PREVENT ACIDOSIS FOLLOWING APPENDICECTOMY FOR ACUTE APPENDICITIS IN A MODERATELY SEVERE CASE OF DIABETES

Date	Diet			Fluid intake mls.	Insulin units	Urine		Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.			Sug.	Diac. acid	Sug. %	Bicarb. vols. %	
July 25–26	30*				20			.13	47	Glucose and insulin during operation
July 25–26						++++	++			5 hours after operation.
July 25–26						++	+			8 hours after operation.
July 25–26						+	o			12 hours after operation.
July 26–27	30*			2200		o	+			
July 27–28	44	3	11	2210		o	+++			Orange juice, gruel, milk, and eggs from July 27 to Aug. 3.
July 28–29	64	23	21	3260		o	+			
July 29–30	64	23	21			o	o			
July 30–31	94	28	26			o	o			
July 31–1	94	28	26			o	o			
Aug. 1–2	94	28	26	2600		o	o			
Aug. 2–3	94	28	26	2900		o	o	.17		
Aug. 3–4	60	60	150	2200		o	o			Regular diabetic diet.
Aug. 7–8	60	60	150	1780		o	o			

*Glucose subcutaneously.

patient is given the regular meals consisting of the usual diabetic foods. The quantity of carbohydrate, protein, and fat is determined by the patient's tolerance and state of nutrition. Needless to say the co-operation of skilled dietitians is desirable; the daily examination of the 24-hour urine for glucose and diacetic acid, and the examination of the blood for sugar and bicarbonate are essential for intelligent supervision. Usually, there is no difficulty in clearing up the urine. We have seldom succeeded in maintaining the fasting blood sugar at a normal level throughout the healing process, even with fair sized doses of insulin amounting to 100 units per day in some instances. The advisability of giving larger doses of insulin was frequently considered. On account of the danger of hypoglycæmia, it was always decided to give the more reasonable quantities unless grave acidosis was present. In most cases the blood sugar content can be kept in the neighborhood of 0.2 per cent or lower.

If the patient is overweight, the food intake may be lowered to from 1,200 to 1,500 calories. For example 50 grams of carbohydrate, 60 to 70 grams of protein, and 100 grams of fat may be given. Loss of excess weight is especially desirable to diminish the burden on the remaining limb, the arteries of which are almost certainly sclerosed, though perhaps not as markedly as in the amputated limb.

Accidental surgical complications. In cases of acute appendicitis, intestinal obstruction, perforated duodenal ulcer, acute mastoiditis, etc., when there is little time for reduction of acidosis and blood sugar, the administration of glucose and insulin hypodermatically before, during, or shortly after operation should become a routine procedure in the majority of instances. These patients receive nothing by mouth, or only sips of water for from 1 to 3 days after operation. Feeding is begun with cereals, orange juice, tea, and later toast, soft cooked egg, milk and junket are added. Anorexia, nausea, vomiting, fever, abdominal distention, or ileus may delay the exhibition of foods for varying lengths of time. During these trying periods the oft-mentioned glucose and insulin combination is really an invaluable procedure. In ab-

TABLE VI.—SHOWING THE ACTION OF INSULIN ON ACIDOSIS COMPLICATING EAR INFECTION

Date 1923	Time	Fluid intake mls.	Insulin units	Urine		Blood		Remarks
				Sugar in 24h.gm.	Diacetic	Sugar %	Bicarb. vols. %	
Jan. 17	3:00 p.m.					.39	19.5	Hyperpnœa.
	3:30 p.m.		25					
	6:30 p.m.					.4	15.2	Paracentesis of ear drums. 20 gms. soda bicarbonate intravenously.
	10:15 p.m.	4700	37	47	++++			
Jan. 18	7:00 a.m.					.5	16.6	
	10:00 a.m.		50					
	2:00 p.m.					.44	14.7	
	3:00 p.m.		50					
	6:30 p.m.		50					
	8:00 p.m.	7900		73	++++	.18	57	Hyperpnœa ceased. 50 gms. soda bicarbonate intravenously.
Jan. 19	11:30 a.m.	4500				.34	22	
Jan. 20		8300		144	++++	.44	20	Soda bicarbonate 50 gms. intravenously.

dominal infections, one must be on guard to combat acidosis which may develop precipitately and without warning.

During convalescence from stomach operations, it does not seem wise to withhold the more easily digestible carbohydrate foods such as gruels, toast, and baked mashed potato, even if the dose of insulin must be raised proportionately. In most instances a diet better adjusted to the metabolic defect can be substituted in a relatively short time.

Sooner or later the daily allowance of carbohydrate, protein and fat is divided into the usual 3 meals, consisting of weighed amounts of fruit, bread or substitute, milk, cream, butter, meat, eggs, vegetables and cheese.

If operations can be deferred as in simple hernia, hæmorrhoids, chronic appendicitis, etc., then it is usually possible to clear the urine of glucose and diacetic acid several days before operation. If the operative procedure requires prolonged ether anæsthesia, then glucose and insulin may be administered during the operation and during the immediate postoperative period.

In conclusion it may be of interest to discuss briefly the use of insulin in non-diabetic surgical patients. There appears to be no valid objection to the injection of any reasonable quantity of insulin, provided it is accompanied by the required amount of glucose. We have given it subcutaneously without untoward results in the proportion of one unit of insulin for each gram of glucose for the acidosis of starvation whatever the cause, and to insure the rapid oxidation of glucose in kidney insufficiency, and in post-operation prostration or shock.

The following data referring to individual patients serves to illustrate and validate the statements preceding. The urine specimens were collected in 24-hour periods from 7 a.m. to 7 a.m.

The relative concentrations of diacetic acid and (in some cases) sugar in the urine are expressed in terms of plus signs; + being the minimum and ++++ the maximum reaction.

CASE 1. The effect of lobar pneumonia, bacteræmia and gangrenous cellulitis of the leg on the carbohydrate metabolism of a mild case of diabetes.

J. W., age 43 years, No. 56,103, was admitted to the hospital January 22, 1923; discharged May 11, 1923. He had suffered with diabetes and ulcer of the leg for 5 years. He had used no dietary restriction. He showed the signs and symptoms of lobar pneumonia, group 1 pneumococcus in the blood, and an extensive gangrenous ulceration of the left leg. On entering the hospital his temperature was 104 degrees, pulse 120, respirations 36, leucocytes in blood 42,000. Four hundred milliliters of anti-

TABLE VII.—SHOWING THE BEHAVIOR OF A CASE OF SEVERE DIABETES COMPLICATED BY CELLULITIS AND "INSULIN SHOCK"

Date	Diet			Insulin units	Urine		Blood		Temp. max.	Remarks
	Carb. gm.	Prot. gm.	Fat gm.		Sug. gm. 24h.	Diac.	Sug. %	Bicarb. vols. %		
Feb. 15					++++	++++	.28	35		
Feb. 16–17	30	30	30	25	28	+	.09	38	100.8	Blood analyzed 3 hours after insulin injection.
Feb. 17–18	30	30	30		38	+			99.4	
Feb. 18–19	30	30	30		36	+			100.4	
Feb. 19–20	30	30	30	15	63	+	.21	35	99.6	
Feb. 20–21	30	30	30		34	+			100.2	
Feb. 21–22	30	30	30		52	++++	.20	39	100.4	
Feb. 22–23	30	30	30	25	..				99.6	
Feb. 23–24	30	30	30	15	20	+	.13	40	100.4	
Feb. 24–25	30	30	30		43	+			99.8	
Feb. 25–26	30	30	30	20	13	+			102.2	
Feb. 26–27	30	30	30		64	++++			100.2	
Feb. 27–2	30	30	30	10	90	++++	.25		99.0	
Feb. 28–1	0	0	0		70	++++			101.6	
Mar. 1–2	0	0	0	20	86	++++	.24	14	98.8	
Mar. 2–3	0	0	0	20	30	++++	.24	26	102.4	Inc. drainage abscess.
Mar. 3–4	30	30	30	40	38	++++	....		101.	
Mar. 4–5	30	30	30	20	27	++++	.25	36	100.8	
Mar. 5–6	30	30	30	40	37	++++			99.	
Mar. 6–7	30	30	30	20	44	++++			99.2	
Mar. 7–8	30	30	30	40	40	++++			97.4	
Mar. 8–9	30	30	30	40	0	0			97.6	
Mar. 9–10	30	30	30	40	0	0			99.6	
Mar. 10–11	30	30	30		11	0	.07		104.4	Weak pulse twitching, semi-conscious' "Insulin shock."
Mar. 11–12	30	30	30		70	0			102.6	Another attack of twitching.
Mar. 12–13	30	30	30	20	0	0	.21		104.	
Mar. 13–14	30	30	30		0	0			103.8	
Mar. 14–15	30	30	30		8	+			102.6	
Mar. 15–16	75	50	150		27	+			104.6	
Mar. 16–17	75	50	150		23	+			105.	2nd operation. Nitrous oxide.
Mar. 20–21	75	50	150	20			.39	76	105.4	Died in stupor.

pneumococcus serum was given intravenously. In spite of the most painstaking surgical care, amputation of the left leg became necessary on account of an infection of the knee joint.

The high blood sugar and glycosuria on admission were somewhat misleading. Table II shows that the ability to burn carbohydrate was only slightly impaired in spite of severe pneumonia with bacteræmia, cellulitis, and purulent arthritis of the knee joint requiring amputation through the thigh. Note the normal blood sugar during convalescence on a diet of 100 grams of carbohydrate, 60 of protein and 150 of fat. Diacetic acid was absent throughout and insulin was not required. Three operations including amputation, were done under nitrous oxide anæsthesia without acidosis. The slow healing of the stump was

TABLE VIII.—SHOWING ALMOST COMPLETE ABSENCE OF REACTION IN A MILD DIABETIC AFTER OPERATION FOR INGUINAL HERNIA UNDER LOCAL ANÆSTHESIA

Date	Diet			Fluid intake mls.	Urine		Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.		Sug. gm.	Diac.	Sug. %	Bicarb. vols. %	
Dec. 11–12	0	0	0		+		.15		
Dec. 14–15	30	30	30	2700	0		.09	49	
Dec. 15–16	30	30	30	400	0	++			Operation.
Dec. 16–17	30	30	30	1700	0				
Dec. 17–18	30	30	30	2300	0	+			
Dec. 18–19	50	50	150				.12	45	
Dec. 26–27	50	50	150		0	0	.12		

the cause of the prolonged stay in the hospital.

CASE 2. Gradual improvement in carbohydrate metabolism during the healing of an infected stump wound following amputation of the leg for gangrene of the foot.

Man, age 62 years, No. 51,644 was admitted April 8, 1924, and discharged August 15, 1924. He was an alcoholic with a history of diabetes for 14 years. He had been in hospital three times previously. He was discharged one month ago on 30 units of insulin and a diet consisting of 70 grams of carbohydrate, 60 of protein, and 150 of fat. His blood pressure was 180-90. He showed evidences of marked arteriosclerosis. Patient gradually developed a purplish area at the base of the little toe and a bluish black bleb on the medial aspect of the big toe. Amputation was done through the upper third of leg under ethylene anæsthesia, lasting 78 minutes. He had an infection of the stump. Healing was prolonged with necrosis of the end of the tibia. Loosening of flaps and traction was required to cover the end of the stump. Patient suffered with hiccough and vomiting for 6 days after operation.

During the remaining 3½ months of his stay in hospital the urine remained sugar free. The diet was gradually increased to 80 grams of carbohydrate, 80 grams of protein, and 150 grams of fat. Insulin was decreased to 10 units each day. Blood sugar on discharge (August 15) was 0.13 per cent.

CASE 3. Acute appendicitis and appendicectomy in a moderately severe case of juvenile diabetes.

Girl, age 21, No. 59,529, weighing 118 pounds, was admitted to hospital March 27, 1924, and discharged, April 17, 1924. She had had diabetes for 2½ years. Diet before operation consisted of 40 grams of carbohydrate, 60 grams of protein, and 120 grams of fat; 18 units of insulin were given each day. Last fasting blood sugar before operation was 0.22 per cent. The signs and symptoms of acute appendicitis appeared during the 24 hours preceding admission to hospital. Temperature on admission was 102 degrees, pulse 124, leucocytes 31,000. Appendicectomy was performed on the night of admission. Ether anæsthesia was used (45 minutes).

The severity of the diabetic condition, the intra-abdominal infection, the operation and ether anæsthesia were the factors responsible for the acidosis. The prompt effect of sodium bicarbonate administration in raising the alkali reserve of the blood is noteworthy.

The severity of the diabetic condition is indicated by the fact that the patient required 50 units of insulin daily to keep the blood sugar down at the time of discharge when the wound was completely healed.

CASE 4. Acute appendicitis and appendicectomy in a moderately severe diabetic.

University instructor, age 33, No. 57,591 was admitted to hospital July 25, 1923, and discharged August 11, 1923. He suffered with a moderately severe case of diabetes of 3 years' duration. This was controlled by intelligent diet restriction. Symptoms of appendicitis began with pain in the right lower quadrant of the abdomen, nausea and vomiting for about 24 hours preceding admission. Operation was done on July 25, under nitrous oxide-oxygen anæsthesia, lasting 50 minutes.

The gradual disappearance of glucose and diacetic acid from the urine in the period immediately following operation was probably due to the glucose and insulin administration.

CASE 5. Acute otitis media, mastoiditis, acidosis, coma, and death.

L. D., girl, age 23, No. 56,057, weight 121 pounds, height 5 feet 3½ inches, was admitted January 17, 1923, and died January 21, 1923. This was a neglected case of diabetes of 4 years' duration. She had had

TABLE IX.—THE EFFECT OF GLUCOSE AND INSULIN ON DIABETIC ACIDOSIS OCCURRING AFTER OPERATION

Date 1923	Diet			Insulin units	Fluid intake mls.	Urine		Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.			Sug. gm.	Diac.	Sug. %	Bicarb. vols. %	
Mar. 22–23	40	50	100	0		0	0	.13		
Mar. 23–24	40	50	100	0		0	0			
Mar. 24–25	40	50	100	0		0	0			
Mar. 25–26	40	50	100	0		0	0			
Mar. 26–27	0	0	0	0		0				Operation 1 p.m. Mar. 26. Vomiting began 5 hrs. later
Mar. 27–28	25*			10		++	++++	.22	24	9 a.m. Mar. 27.
	15*			10		+++	++++	.27	36	4 p.m. Mar. 27.
				10						8 p.m. Mar. 27.
	30			10	1300	27.6	+++			12 m. Mar. 27.
Mar. 28–29	85			20	2000	6.3	+++	.14	40	
Mar. 29–30	40	50	50	20	3500	8.3	+	.24	45	
Mar. 30–31	40	50	50	12	3150	4.8	0	.2	48	
Mar. 31–1	40	50	50	0						
Apr. 1–2	75	60	175	10	3100	2.8	0			
Apr. 4–5	75	60	175	0	3200	0	0	.16	56	
Apr. 10–11	75	60	175	0	2700	0	0	.18		

*Glucose hypodermatically.

earache for 2 days. When first seen both drums were red and bulging and there was tenderness over both mastoid processes. The urine on admission contained large quantities of sugar and diacetic acid.

This patient entered the hospital when our experience with insulin had just begun. Our entire supply, about 200 units, was administered in the course of 27 hours. The fatal issue might have been prevented had we been able to obtain more of the hormone at the time. The consulting otologists did not think that the signs or X-ray picture warranted exploration of the mastoid processes. At autopsy both processes were diseased.

CASE 6. Severe diabetes complicated by cellulitis and insulin shock. Man, age 30 years, No. 56,304, was admitted to hospital February 15, 1923, and died March 21, 1923. He had had a moderately severe diabetes for 7 years. Irregular diet control. During the past year patient ate all food except sugar. Carbohydrate tolerance was found to be 15 grams at another hospital. Cellulitis of the nose began 12 days ago. Cellulitis of the trochanteric region noted on February 23.

This patient, a severe diabetic, came under observation early in our experience with insulin. In the light of present knowledge, it would seem that a larger amount of food, especially carbohydrate, would have served to maintain a better state of nutrition and thus have prevented hypoglycæmia.

Death was apparently due to toxæmia though blood cultures were consistently negative.

CASE 7. Behavior of a mild diabetic patient after operation for inguinal hernia under local anæsthesia. Man, age 45, No. 55,782. Patient was admitted December 11, 1922, and discharged December 29, 1922. He had never had symptoms of diabetes. He states that he dieted during the past year and was sugar free. Operation for reducible inguinal hernia was done under local anæsthesia.

It will be seen that there is almost complete absence of change in the blood or urine except for the presence of a small amount of diacetic acid. The factors probably responsible for this favorable result are preparation, local anæsthesia, and mildness of the diabetes.

CASE 8. The treatment of postoperative diabetic acidosis by means of insulin and glucose. Woman, age 41, No. 56,582, weight 128½ pounds was admitted March 21, 1923, discharged April 11, 1923. Patient had had diabetes for 3 months. She

TABLE X.—PREVENTION OF SEVERE ACIDOSIS BY MEANS OF INSULIN AND GLUCOSE ADMINISTERED BEFORE OPERATION

Date 1924	Diet			Insulin units	Fluid intake mls.	Urine		Blood		Remarks
	Carb. gm.	Prot. gm.	Fat gm.			Sug. gm.	Diac.	Sug. %	Bicarb. vols. %	
Feb. 8–9						0				
Feb. 9–10	70	60	175		2100			.09		
Feb. 14–15	70	60	175		900	0	+			
Feb. 16–17	25*			20		.56	++++			Operation at 9.22 a.m.
Feb. 17–18	?				1300		+++			Vomited 4 times.
Feb. 18–19	?				2300		++++	.19	41	
Feb. 19–20	70	60	175	10	2180	+	++++			
Feb. 21–22	70	60	175		2100	0	0			
Feb. 24–25	70	60	175		2500	1.83	+++	.15		
Feb. 28–29	70	60	175	20	1400	0	0			
Mar. 8–9	70	60	175		2450	0	0	.15		
Mar. 28–29	70	60	175			0	0	.13		

*Glucose and insulin at 9 a.m. Operation 22 minutes later. Lasted 94 minutes.
Nitrous oxide, oxygen and ether anæsthesia.

had become sugar free on 40 grams of carbohydrate, 50 grams of protein and 120 grams of fat. She was operated upon for repair of right femoral hernia under local anæsthesia.

The operation which lasted 1 hour was done under local anæsthesia at 1 p.m. the patient not having received breakfast or luncheon. The acidosis was easily controlled by repeated small doses of glucose given by mouth, subcutaneously and by rectum, accompanied or preceded by small doses of insulin. Later insulin could be omitted entirely though the diet was increased to 75 grams of carbohydrate, 60 of protein, and 175 of fat. The severe acidosis might have been avoided had the glucose and insulin been given before operation, as is customary now.

The patient had a recurrence of the hernia and was operated upon about 1 year later, with the results shown in Table X.

Although the second operation required 94 minutes and was performed under ether and nitrous oxide anæsthesia, it was possible to prevent severe acidosis by the prophylactic use of glucose and insulin. The lengthy stay in the hospital was occasioned by an infection of the herniotomy wound.

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FURTHER OBSERVATIONS ON THE EFFECT OF DUODENOBILIARY DRAINAGE ON THE VISUALIZED GALL BLADDER[1]

By DANIEL N. SILVERMAN, M.D., and LEON J. MENVILLE, M.D., New Orleans

FOLLOWING the experiments recently published in our preliminary report (1), we have made further studies of the visualized gall bladder before and after non-surgical biliary drainage with the introduction of magnesium sulphate solution directly into the duodenum (Lyon Meltzer technique). In the original work it was noted that the gall-bladder shadow, resulting from the intravenous injection of the sodium salt of tetrabromphenolphthalein (Graham method), was reduced in size and altered in shape by a single instillation of magnesium sulphate solution into the duodenum followed by biliary drainage. This reduction in size of the gall-bladder shadow was slight but quite distinct after a single dose of the salt solution and then drainage.

We have extended our experiments to other patients in an effort to determine if repeated injections of magnesium sulphate solution into the duodenum would produce more complete drainage of the gall bladder, visualized at intervals during the biliary drainages. It was observed that the gall bladder was reduced in size until there was almost a complete disappearance of its shadow within a comparatively short period of time. We have used the same roentgen-ray technique as that described in the preliminary report (1).

Graham, Cole, and Copher's (2) interpretation of the normal gall bladder is based upon the following findings: "Usually at about the fourth to the seventh hour after the injection, a faint but definite outline of the gall bladder appears which is seen to have the contour of the normally shaped organ but to be somewhat larger than normal gall bladders usually seen at laparotomy. At the end of 24 hours the shadow is much more distinct but con-

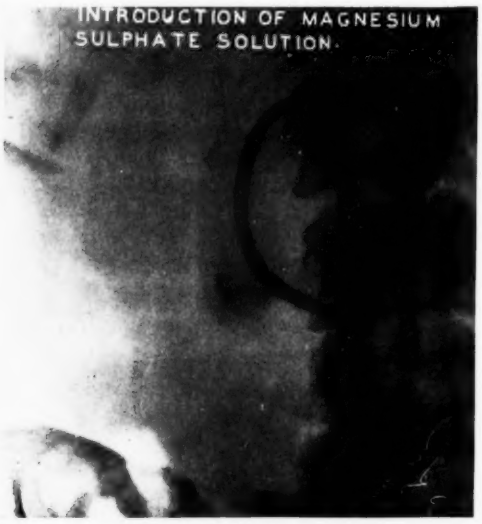

Fig. 1. Case 1. Roentgenogram showing the gall-bladder shadow 12½ hours after the intravenous injection of the sodium salt of tetrabromphenolphthalein immediately before the introduction through a tube of magnesium sulphate solution.

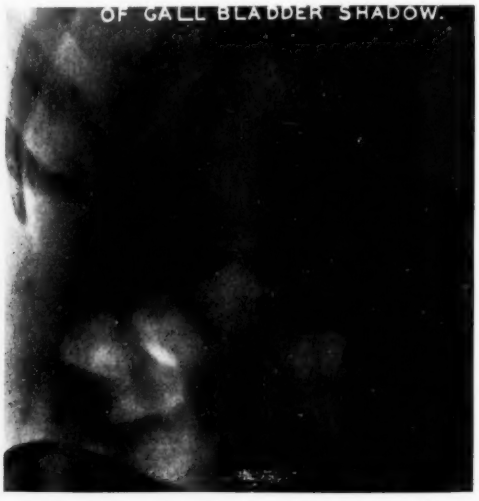

Fig. 2. Case 1. Gall-bladder shadow after 2 stimulations of magnesium sulphate solution and drainage over a period of 1 hour. (Operative diagnosis: chronic cholecystitis.) Note the marked reduction in size of the gall-bladder shadow.

[1] From the Department of Medicine, Division of Clinical Medicine and Radiology, Tulane University of Louisiana. This is the second of a series of articles on a study of the effect of magnesium sulphate administration on the visualized gall bladder

Fig. 3. Case 2. Gall-bladder shadow 12 hours after injection of tetrabromphenolphthalein, immediately before introduction of magnesium sulphate solution. Tube in second dorsal portion of duodenum.

Fig. 4. Case 2. Gall-bladder shadow after two stimulations of magnesium sulphate solution and drainage over a period of 1 hour. Note the reduction in size of the gall bladder.

tracted down to only about one-half of its earlier size." It has also been our experience that the normal gall bladder will require from 16 to 20 hours to reduce itself one-half.

A pathological gall-bladder shadow visualized 12 hours after the injection of 5.5 grams of the sodium salt of tetrabromphenolphthalein, was reduced in size 50 per cent within 1 hour. This was accomplished by the introduction of magnesium sulphate solution directly into the duodenum at 20 minute intervals followed by duodenobiliary drainages (Case 1).

In another individual the gall-bladder shadow was reduced in size approximately 50 per cent within a period of 2 hours. This result was obtained by drainages following 4 injections into the duodenum of magnesium sulphate solution (Case 2).

REPORT OF EXPERIMENTS

CASE 1. F. H. F., white male, age 35, examined July 19, 1924, complained of soreness in the upper abdomen with a burning sensation. There was tenderness on pressure in the epigastrium. August 20, 1924, 5.5 grams of the sodium salt of tetrabromphenolphthalein was injected intravenously in two equal doses, at 8:30 and 9 a. m. respectively, after a fast of 15 hours. The duodenal tube was introduced at 6 p. m. and the gall bladder visualized after the tube had entered the second portion of the duodenum, at 9:15 p. m. (Fig. 1). Immediately following, 50 cubic centimeters of a 25 per cent solution of magnesium sulphate was introduced through the tube into the duodenum. After a lapse of 8 minutes duodenobiliary drainage was allowed to take place for ½ hour. Then, an additional 50 cubic centimeters of the same magnesium sulphate solution was introduced into the duodenum and followed by biliary drainage for ½ hour. At 10:30 p. m. the second roentgenogram (Fig. 2) was taken and showed a reduction in size of 50 per cent. October 14, 1924, the patient was operated on and the gall bladder was removed because of evident pericholecystitis. The histological diagnosis was chronic cholecystitis.

CASE 2. P. P., white male, age 32, seen August 26, 1924, complained of periodic attacks of abdominal disturbances and headache. The liver was palpable. The duodenobiliary contents contained numerous pus cells.

August 31, 1924, 5.5 grams of the sodium salt of tetrabromphenolphthalein was injected intravenously in two equal doses at 8 and 8:30 p. m., respectively, after a fast of 10 hours. At 10 a. m. the next morning, the gall bladder was visualized (Fig. 3) with the tube in the second portion of the duodenum. Immediately following, 50 cubic centimeters of a 25 per cent solution of magnesium sulphate was introduced through the tube into the duodenum. After a lapse of 8 minutes, biliary drainage through

Fig. 5. Case 2. Gall-bladder shadow after four stimulations of magnesium sulphate solution and drainage over a period of 2 hours. Note the marked reduction in size of the gall bladder.

the tube was allowed to take place for 20 minutes. This was followed by a similar dose of the salt solution and drainage for an additional 20 minutes. Another roentgenogram (Fig. 4) was made. Immediately following this, 50 cubic centimeters of the magnesium sulphate solution was introduced. After 8 minutes duodenobiliary drainage was allowed to take place for 20 minutes. Then the last or fourth dose of 50 cubic centimeters of the magnesium sulphate solution was introduced through the tube. After a lapse of 8 minutes biliary drainage was instituted for 20 minutes more. A roentgenogram (Fig. 5) was made and it demonstrated the persistent reduction in size of the gall bladder as a result of repeated injections of magnesium sulphate solution followed by duodenobiliary drainages.

CONCLUSIONS

1. The duodenobiliary drainages with repeated injections of magnesium sulphate solution have produced decided reduction in the size of the gall-bladder shadow, visualized by the intravenous injection of the sodium salt of tetrabromphenolphthalein.

2. The gall bladder is more completely drained by repeated stimulations of the duodenal mucosa with magnesium sulphate solution.

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FRACTURES OF THE LOWER END OF THE RADIUS[1]

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FOR some time past, I have been especially interested in the study of fractures of the lower end of the radius, being impelled thereto by several considerations. In the first place, fractures in this situation are undoubtedly among the most frequent with which the general practitioner has to deal. While the actual figures in various compilations of statistics may vary somewhat as to percentage, a careful consideration of any large series of fractures in general will show that those of the radius at the so-called "typical situation" come very close to the head of the list as regards frequency. According to Bardenheuer (2) typical fracture of the radius takes first place in frequency among all fractures; according to Dupuytren (8), Hoffa (14), and Storp (40), it constitutes 10 per cent of all fractures; according to Bruns (5), 18 per cent. Plagemann's statistics (32), based upon 1,393 fractures, all confirmed by roentgenogram, give it a percentage of 5.74, which is exceeded only by fracture of the shaft of the tibia and fibula, with a percentage of 6.604.

Since it is so common, and so well known to all of us under the usual name of "Colles' fracture," it would naturally seem that the treatment of the condition should be fairly well standardized, and the results uniformly good, but such is far from being the case. We can all recall cases we have treated in which the wrist is left permanently stiff and swollen, with loss of flexion and extension, weakened grip in the fingers, tendon adhesions, etc.,—in short, a hand and wrist which is permanently crippled. And this, too, in the case of a simple fracture, with no marked displacement or associated injuries.

This is not due to lack of knowledge on the part of the surgeon in charge of the case, but to a disregard of certain factors which are absolutely essential to complete anatomical and functional restoration. In truth, in view of the fact that they are so common, it would seem that more or less familiarity has a tendency to breed a certain amount of contempt, and that very often these fractures are not accorded the careful and painstaking attention that they deserve.

In the vast majority of cases, with proper treatment, complete anatomical and functional restoration may confidently be expected; with improper, or with *incomplete* treatment, a greater or less degree of permanent disability is the result. It is not sufficient to reduce the fracture and apply a circular cast, for in such cases, even though the fracture is a simple one, with no apparent complications, and with perfect reduction of the fragments, the result will certainly leave much to be desired, as there cannot fail to be some limitation of motion in the wrist joint, which will be permanent to a certain degree.

No patient should be put into the permanently crippled class when this can be avoided, even though the crippling is slight, and the effect of it may be overcome by adaptation. It is simply an additional handicap in the struggle for existence, which at best is hard enough for the average normal individual. A fracture of this kind practically always occurs during the period of greatest activity, and permanent disability usually means lessened earning power. Since many of these cases occur in industry, the broader aspect of the economic loss to society, which is large in the aggregate, must also be taken into consideration. Today, with workmen's compensation laws so generally in force, all employers of labor carry insurance. Any permanent disability is paid for by the insurance company, which passes the cost on to the employer, who in turn passes it on to the consumer in the price of his product, so that ultimately society at large pays the bill. Improvement of the end-results in the treatment of industrial accidents will naturally reduce this bill.

Any improvement in the end-results of fracture of the lower end of the radius can only be brought about by careful and pains-

[1] Read before the Green Bay Academy of Medicine, September 11, 1924.

taking attention to details in treatment, and in order to carry out this treatment intelligently, or in fact, the treatment of any condition, a clear knowledge of the why and wherefore, the rationale, in other words, is necessary; in this particular instance, we should endeavor to understand the usual mechanism by which the fracture is produced.

Reduction is effected by reversing the mechanism. In the after-treatment, massage and passive motion stand out prominently. If these are conscientiously carried out after complete reduction of the fracture, excellent results with practically no permanent disability are the rule.

In addition to these practical considerations, this fracture is of great academic interest. It is nearly always produced by indirect violence; in fact, I do not believe that a fracture in this situation could be produced by direct violence alone, except in the case of crushing injury. There are only two main exciting causes; falls on the outstretched arm and hand, which account for the great majority of cases; and "kicks" from backfiring gas engines, which give rise to a smaller number. Conversely, it is true that either of these causes, if it produces a fracture at all, always produces a fracture of the radius at the typical site; it does not produce a fracture of the ulna, or of the shaft of either bone, or an injury to the elbow or shoulder, in certain instances. Such being the case, it follows that the same combination of forces, or combinations of forces having the same effect, must always be active preceding, during, and following the fracture of the bone, since a given effect must be produced by a given cause. This gives rise to some questions, the solution of which would be interesting. For example, what are the forces concerned? What is their method of transmission? Why does the radius fracture at what is apparently its thickest part, instead of at the comparatively more fragile neck? These are a few of the questions which have given rise to a great deal of discussion for the better part of a century, and the answer constitutes the explanation of the mechanism of the fracture.

For the purposes of this investigation, in addition to a review of my own records, I have studied over 200 roentgenograms of fractures of the wrist[1], very kindly placed at my disposal by St. Vincent's Hospital of this city, and have endeavored to cover thoroughly the literature on the subject especially the more extensive contributions.

OCCURRENCE AND ETIOLOGY

Bony injuries at the lower end of the radius may be divided conveniently into three classes, namely: (1) epiphyseal separations; (2) incomplete fractures, or fissures; and (3) complete fractures. With the first two classes we are not particularly concerned in this paper, which deals with true fractures of the lower end of the radius. However, it may be stated here that epiphyseal separations occur in youth, before union of the epiphysis has taken place, this union ordinarily being completed by the twentieth year of life. They correspond to the typical fracture of adult life and are presumably produced by the same mechanism. According to Vogt and Bruns (45) they may be divided into chondro-epiphyseal separations and osteo-epiphyseal separations. In the former, as the name implies, the separation takes place through the proximal portion of the epiphyseal cartilage, occurs in childhood, and is relatively and absolutely infrequent; in the latter, the separation takes place through the extreme distal bony portion of the diaphysis, occurs in later childhood and youth, is very common following falls upon the hand, and corresponds to the adult fracture.

Incomplete or fissured fractures follow the long axis of the bone, are rare, and are frequently overlooked.

Complete fractures of the lower end of the radius are ordinarily spoken of as "Colles' fractures," but as a matter of fact, this term is not strictly accurate. The fracture described by this surgeon is about 1½ inches above the lower articular surface, and, except as a result of direct violence, is very rarely met with. The site of the "typical" fracture lies much nearer the carpus, and measuring from the carpal articular surface, is given by various authors as follows (see Kahleyss, 17):

[1] A statistical report of this study will appear in an early number of the *Annals of Surgery*.

Colles	40 millimeters
Hamilton	7 to 40 millimeters
Drake	15 to 30 millimeters
Koenig	10 to 30 millimeters
Middeldorpf	20 to 26 millimeters
Dupuytren	7 to 26 millimeters
Smith	6 to 26 millimeters
Hoffa	10 to 20 millimeters
Linhart	13 millimeters
Nélaton	9 to 11 millimeters
Albert	5 to 10 millimeters

Bardenheuer gave the site as 8 millimeters anterior to, 16 millimeters posterior to, and 26 millimeters above the tip of the radial styloid. As may be seen, the limits vary somewhat, and depend upon from what side the fracture is viewed, and also upon the direction of the line of fracture. Briefly, it may be said that the typical fracture of the lower end of the radius is a more or less transverse one in the vicinity of the junction of the epiphysis and diaphysis, that is, within one-half to three-quarters of an inch, or 10 to 20 millimeters, of the lower articular surface. It is frequently accompanied by injuries to associated structures, the complication oftenest present being fracture of the ulnar styloid, and more rarely, fracture of some of the carpal bones.

Typical fracture of the radius is almost exclusively confined to adult life: that is, it is very exceptional to find it before union of the lower epiphysis has occurred. This union takes place usually about the nineteenth or twentieth year of life. Previous to this, we find either a separation of the epiphysis or a fracture of the shaft of the bone. According to Hoffa (14), the fracture occurs most frequently between the ages of 50 and 60, next in the fourth decennium, and least often in the second and third.

It occurs more frequently in women than in men, a fact which is difficult of satisfactory explanation, unless on the basis of greater fragility of bone. According to Morris (26), of 169 fractures, 114 were in women, and 55 in men; according to Krantz (19), of 243 fractures, 157 were in women, and 86 in men. Since more men than women are engaged in industry, this seems to show that as an industrial accident, the fracture is not very frequent.

The exciting cause is practically always indirect violence, as was stated previously. It usually results from a fall upon the outstretched arm with the hand in a position of pronation, and the wrist more or less hyperextended. With the widespread use of the gasoline motor in recent years, an additional source of indirect violence has been introduced, namely, the "kick" of a motor backfiring while it is being cranked.

ANATOMY

Before proceeding to a discussion of the mechanism by which these fractures are produced, it is desirable to review briefly the general features of the anatomy of the parts concerned, including the forearm and elbow joint. Time will not permit me, nor is it at all necessary, to enter into an exhaustive description of these parts. Various authors have laid marked emphasis on certain anatomical structures for the purpose of supporting different theories of mechanism, and these will be indicated as we proceed.

Taking the various parts of the forearm from above downward, we come first to the elbow joint. It might seem like going rather far afield to consider the structure of this joint in a paper on fractures of the lower end of the radius, but it is necessary, for through this articulation is transmitted one of the forces active in producing the fracture, namely, the weight of the body in falls upon the arm and hand. Three bones enter into the formation of the joint: the lower extremity of the humerus, and the upper extremities of the radius and ulna.

The upper extremity of the ulna resembles a half-closed hand, the coronoid process corresponding to the thumb, and the olecranon to the fingers (Hennequin, 13). These embrace the trochlea of the humerus, which presents a groove to receive the blunt ridge extending from the coronoid to the olecranon and dividing the sigmoid cavity of the ulna into two concave facets, which are in immediate contact with the faces of the trochlea of the humerus. The ulna is thus directly continuous with the humerus, and on this account, in falls upon the hand or wrist, any force of impulsion is mainly transmitted from the former to the latter, and vice versa. Likewise, from the nature of the articulation,

the ulna is mainly concerned with the movements of flexion and extension.

When we examine the upper extremity of the radius, we find conditions considerably different. While the head of the bone articulates with the humerus, nevertheless this contact is not nearly so close as that of the ulna, except in flexion at a right angle; its articulating surface is also very small, compared to that of the ulna. On the other hand, it has a much more intimate articulation with the lesser sigmoid cavity of the latter bone. As a result of this, the humeroradial articulation plays a more or less passive rôle in flexion and extension, but together with the radio-ulnar joint, is almost exclusively useful in pronation and supination.

Let it be particularly noted that the most intimate contact between forearm and upper arm is between humerus and ulna, force being thus mainly transmitted through the latter bone instead of through the radius.

The joint is enclosed by a strong fibrous capsule, and is additionally strengthened by anterior and posterior, internal and external, lateral ligaments.

Next for consideration is the forearm, whose skeleton is composed of two bones, the radius and ulna. Placed as they are between the humerus and the wrist, connected by numerous and powerful ligaments, their middle portions bound together by the interosseous ligament or membrane, they are rendered so solid that they may almost be considered as one bone, except in the movements of pronation and supination, which are a function of the radius alone.

The ulna shows two curvatures (Destot and Gallois, 7): a large one, with the convexity outward, and a lesser one, at the lower part, with the convexity directed posteriorly. To this latter curvature, some authors have attached great importance in the localization of fractures at the lower end of the bone, believing that it becomes exaggerated under compression, as occurs in falls upon the wrist, and thus, following a known law, fracture takes place from behind forward, at point of tension rather than that of compression.

The ulna likewise shows two curvatures, giving it the form of an elongated letter S: a superior convexity on the side of the radius, and an inferior convexity on the inner side. The latter coincides with the weaker part of the bone. Any force acting parallel to the axis tends to exaggerate these curves, and acts maximally upon the inferior convexity.

As has been previously shown, it articulates solidly above with the humerus; below, it is separated from the cuneiform bone of the carpus by the triangular ligament, or triangular articular fibrocartilage. It is not so long as the radius by 4 millimeters, if the olecranon process and styloid of the radius are not considered (7). For this reason, ordinarily it does not fracture at the same time as the radius. According to Brossard, a wedge, 1 centimeter in thickness, must be placed under the hypothenar eminence to break both bones simultaneously. Therefore, in actual clinical fracture, impaction of the radius must be considerable before fracture of the ulna occurs. The hypothenar eminence is on a higher plane than the thenar, consequently it is less exposed.

The interosseous ligament is the most powerful feature of union between the bones of the forearm. Slight at the extremities, the middle portion is made up of numerous strong and resistant fibers, running obliquely from above downward, and from outside in, from radius to ulna. These fibers insert themselves on the sharp edges of the two bones. The ligament terminates at the level of the inferior radio-ulnar articulation. It maintains the solidity of the two bones by combining shocks, keeps them at their usual distance by preventing exaggeration of their lateral curvatures, and possibly has a rôle in the transmission of force from humerus to radius (Hennequin, 13).

The lower extremity of the radius is made up of spongy or cancellous tissue, and is restrained anteriorly and posteriorly by the neighboring tendons. However, on its external surface, it is very accessible and by the separation of the diaphyseal plates, it broadens out in giving rise to an articular surface enlarged transversely, irregularly elliptical, upon which are two faces separated by a crest: one internal, irregularly spherical; the other triangular, at the lowest point descending under

the styloid. This articular surface looks forward and inward and the posterior lip descends lower than the anterior. As a result of this disposition, the axis of the forearm is not directly prolonged with that of the hand but forms with the latter an angle opened internally. Prolonged, the axis of the forearm would cut the index finger, while that of the hand would strike about the middle of the external aspect of the forearm. The radial styloid descends much lower than the ulnar. As a result of the obliquity of the transverse axis of the radio-ulnar articulation, it may be seen that in extension as in flexion, the hand will be drawn away from the radial side. The radiocarpal articular surface is thus differently constituted at its inner and outer parts, and the radius alone is in direct contact with the os naviculare and semilunare; it is by means of these two bones that the entire transmission of force from carpus to radius takes place.

The principal feature of the union between the inferior extremities of the radius and ulna is the triangular ligament. Running almost horizontally, it is inserted by its base to the inferior border of the lesser sigmoid cavity of the radius; by its summit, to the articular facet and styloid process of the ulna. Viewed from its distal surface, it is seen to prolong the articular surface of the radius and to separate the terminal facet of the ulna from the carpal semilunar and cuneiform.

Turning now to the carpal side of the articulation, we find a condyle to be made up of the navicular, semilunar, and cuneiform bones. The latter takes only an insignificant part, being situated, on its inner side, on a much lower plane. The cartilaginous covering of the condyle extends more on the posterior surfaces of the navicular and semilunar bones than on the anterior.

A joint capsule is present, but the real means of union are the anterior and posterior, and the internal and external lateral ligaments. Close contact is also assured by the muscles and tendons of the forearm.

On account of the importance of the anterior radiocarpal ligament in the mechanism of this fracture, a few additional details are necessary. It is made up of three sets of fibers, according to Pilcher (31), having their point of origin on the anterior surfaces of the os naviculare, and semilunar and cuneiform bones. The first set of fibers is the strongest portion of the ligament; they pass obliquely outward and become inserted in the styloid process and adjoining anterior margin of the radius. The second set is also a strong band, and passes obliquely in the opposite direction, to be inserted into the styloid and anterior margin of the ulna. The third set consists of a broad and less dense band passing directly upward, to insert into the greater part of the anterior margin of the radius.

The inferior articular surfaces of the first row of carpal bones unite with those of the second row to form the mediocarpal articulations. Between these cartilage covered surfaces, the bones present rough superior and inferior surfaces for the attachment of ligaments. The lateral faces are designed for the interosseous articulations, except the external face of the os naviculare, which rolls under the radial epiphysis. The first row is very mobile in the radiocarpal articulation; less so in the mediocarpal by reason of its irregularity, and also as a result of the position of the center of rotation. The second row forms with the metacarpus an almost immobile block. A study of the ligaments implies an almost perfect solidarity in the entire bony mass (Destot and Gallois, 7).

MECHANISM

Having thus reviewed the anatomy of the parts concerned, let us now take up for consideration the mechanism of production of fractures at the lower end of the radius. This question has been under discussion for years, and a voluminous literature on the subject has arisen. From a fairly extensive survey of this literature, from the study of X-rays, and from reasoning, I do not believe that any one single mechanism will satisfactorily explain all fractures.

All theories of mechanism fall into one of three classes, depending upon the modes of force transmission, as follows:

1. The force is transmitted by means of bony segments exclusively, no ligaments

being involved. To this class belong the theories of Dupuytren, Nélaton, and Malgaigne.

2. The force is concentrated upon the anterior radiocarpal ligament, which tears off a fragment. Here belong the theories of Le Comte, Tillaux, Delbet, Contremoulin, and Pilcher.

3. The force follows a complex course from humerus to ulna, and from ulna to radius, by way of the interosseous membrane. This view is defended by Lopes and Hennequin.

One of the earliest theories was that of Ponteau and Le Petit (33), who compared the radius and ulna to a bow and bow-string. In a fall, the elasticity of the bow is exceeded, and it breaks. This was a poor explanation and was soon succeeded by others. In the first half of the nineteenth century, it was generally the view that the typical fracture arose through *coup et contrecoup*, or compression. The most zealous advocates of this view were Dupuytren (8), Malgaigne (25), and Nélaton (29). Nélaton attempted to prove it by experiments on the cadaver.

In these experiments, the forearm was exarticulated at the elbow, the olecranon sawed off, and the detached forearm supported vertically on a plane surface with the hand at right angles, in the position of hyperextension. A heavy blow with a hammer was then given upon the upper end, and as a rule, fracture of the radius at the typical site took place. Later, however, it was found that typical fracture did not occur nearly so frequently if the anterior radiocarpal ligament was sectioned, the other conditions of the experiment remaining the same.

Another view gradually gained ground. Bouchet (4, 1834) did not believe that the radius fractured between two opposing forces, but that the lower end was torn off, following strong extension of the hand, and as a result of traction by the anterior radiocarpal ligament. According to Voillemier (46), transverse fractures arose through the pull of the strongly stretched capsular ligaments, while diagonal fractures and impacted ones arose through direct violence. Continuing this, Le Comte (23) stated in 1860 that all typical fractures arose through *arrachement* or tearing, and discarded altogether the theory of *coup et contrecoup*.

Pilcher of Brooklyn is a strong exponent of this theory (31), and his article on the subject is very convincing. I quote from his description of the mechanism.

> That fractures of the lower extremity or base of the radius should be of frequent occurrence one appreciates when the mechanism of its usual production is understood. A fall, and the force of the fall broken by an outstretched arm with hand in extension, are the usual conditions from which it results. In the course of such an accident, forcible bending back of the hand with overtension of the anterior common ligament of the carporadial joint is produced. Strain is brought to bear on the projecting anterior lip of the lower end of the radius. The slipping first row of carpal bones as it moves in the cup-like cavity of the lower articular surface of the radius furnishes the mechanism through which the force is transmuted into a cross breaking strain upon the bone into which the ligament is inserted, with the result that that portion of the bone is torn off.
>
> Examine a longitudinal section through the wrist-joint from the middle of the radius to the middle of the third metacarpal bone. The section passes through the semilunar and the outer portion of the os magnum. The carpal bones and the metacarpals are joined together with such firmness that but slight motion is permitted between them. In the movements of flexion and extension at the wrist they act virtually as one bone. At the lower extremity of the radius projects anteriorly a prominent lip, into which is inserted the anterior radiocarpal ligament, the extent of insertion of whose fibers is continued for a quarter inch or more above the articular margin. This ligament, though dense and strong, is sufficiently loose to permit considerable latitude of motion backward of the carpus upon the radius. The posterior radiocarpal ligament unites the bones together behind similarly.
>
> The bones thus related constitute two levers[1]. They may be represented as in the accompanying diagram by *A* and *B*, held together by bands at *C* and *D*. When *B* is forcibly carried backward (extension of the hand), the band *D* is made tense; the opposite border of the lever, having slipped forward as far as the band *C* will permit, now abuts against the lower surface *A*, which becomes a fulcrum for the further action of the lever. The mechanical arrangement is such that an immense power may be exerted. If the backward force continues to act, either the band *D* must rupture or a lever be fractured. The projecting lip upon the upper lever puts it at a disadvantage. The band continues to sustain

[1] In the article quoted, this description is accompanied by two diagrams, in which *A* corresponds to the radial lever, *B* to the carpal lever, composed of carpal bones and metacarpals considered as one bone, *C* to the posterior radiocarpal ligament, and *D* to the anterior radiocarpal ligament.

the strain. The lever gives way. The point of fracture is necessarily just above that portion of the lever controlled by the band. The strain upon the lever is nearly transverse to its long axis. By this the direction of the line of fracture is determined. A fracture has been produced by definite forces, at a definite point and in a definite direction. These are practically the conditions which unite in the production of the more common fractures of the inferior extremity of the radius.

By the powerful leverage which the extended hand and carpus obtain through the strong anterior ligament upon the lower end of the radius, that portion of the bone is literally torn from it.

When the lower fragment of the radius has been torn off it becomes virtually a part of the carpus with which it moves and by which it is carried backward.

This, then, constitutes the mechanism of the fracture according to Pilcher, who is representative of a group of adherents to this theory. He has likewise established the truth of it by experimental demonstration upon the fresh cadaver. For this purpose, the forearm is firmly held, and the wrist bent sharply backward until something gives way, usually with a snap. Upon dissection, as a rule, the radius will be found to be fractured at about the typical site, although occasionally the anterior radiocarpal ligament will be found to have ruptured. Clinical evidence is also presented in which this mechanism has certainly been active.

According to this conception, other forces, such as that of impact, the perpendicular wedge-like impact of the carpus against the articular cup of the base of the radius, descent of the upper fragment into the lower, and explosive splitting of the lower fragment, account for comminution, impaction, and displacement. These forces come into action after the fracture has taken place.

We have still to consider the third class of theories mentioned above: that in which the force follows a complex course from humerus to ulna, and from ulna to radius. The theory of Hennequin (13) is representative of this group. As has been shown above, the contact between ulna and humerus is much more extensive and intimate than that between radius and humerus; on the other hand, at the wrist conditions are reversed, and the ulna scarcely enters into the formation of the articulation at all. Hennequin believes that the force of the falling body is transmitted from humerus to ulna, thence by means of the interosseous ligament to the radius, attaining its maximum concentration at the lower end of the latter bone. Here it meets with the resistance offered by the hand coming in violent contact with the ground. Force and resistance are equal in opposite directions, according to the well known physical law; likewise, a law of mechanics states that when a lever of non-homogeneous construction is subjected to two opposing forces, it breaks at a point intermediate to the application of the forces, nearest to the place where they concentrate. The radius corresponds to a lever of non-homogeneous construction, and under the conditions of a fall, is subjected to two opposing forces; therefore, it breaks at the point of their maximum intensity, or at its lower end.

To me, this theory is very attractive, the detailed presentation of it by its author is very plausible, and I am convinced that it may be invoked to explain some fractures, although not all.

We have now briefly considered a representative of each of the three classes of theories of mechanism. The very fact that such a multiplicity of theories exists would seem to prove that no one would satisfactorily account for all fractures, and reasonable objections have been raised to all.

For instance, against the theory of tearing off of the lower fragment by the anterior carpal ligament, it has been urged (Hennequin, 13) that this ligament can have no action on the lower extremity of the radius except when the hand is extended so as to make a right angle with the forearm. As this degree of hyperextension is rarely realized in falls on the palm of the hand, the intervention of another factor is necessary. This is undoubtedly true. But in automobile fractures, this hyperextended condition is the rule, and not the exception. Again, by this theory, it is difficult to explain the comminution of the lower fragment, which is common; and difficult to explain impaction and posterior deviation of the upper end of the lower fragment with anterior deviation of the upper fragment.

Loebker (24) believes that any of these mechanisms, or more frequently, combinations of them, may be active in any given case, and I am also of this opinion; but I further believe that a great many of the fractures in this situation are caused by the impact of the carpal bones against the lower end of the radius, with simultaneous damage to the ligamentary apparatus of the wrist joint, the extent of the fracture being dependent upon the attitude of the wrist and the severity and duration of the violence, as held by Walkowitsch (48).

Just a few words to make this clear. Take the conditions present in a fall, with the hand in hyperextension and deviated toward the ulnar side, as is natural under the circumstances. Under such conditions, the cartilaginous surface of the os naviculare begins to press against the posterior or dorsal border of the radial articular surface. The carpus deviates radially, bringing pressure to bear especially upon the styloid of the radius, and leading to stretching of the external lateral ligament of the wrist joint. On the ulnar side, conditions are reversed, the pressure coming on the volar side, with simultaneous stretching of the internal lateral ligament. If now the radius attempts to pronate, it is hindered by the os naviculare, and we have a concentration of two forces at this point.

The entire force may be expended on the posterior border of the articular surface breaking it off; or more commonly the two forces, one due to the dorsal push of the carpus against the lower end of the radius, and the other a torsion from radial to ulnar side, due to the action of the pronators on the upper portion of the radius, come together higher up.

It should be emphasized that the pressure of the carpus on the joint end of the radius, or vice versa, the radius on the carpus, can exert its full influence only when the internal lateral ligament, which prevents ulnar deviation of the hyperextended hand, is torn. There are several things speaking in favor of this, chief of which is the fact that the most frequent complication of fracture of the lower end of the radius is fracture of the ulnar styloid, to which this ligament attaches. In other cases, the ligament may be torn without fracture of the ulnar styloid. This is not demonstrable by X-ray, but may be assumed from localized pain and tenderness, ulnar deviation of the hand, and prominence and palpability of the lower end of the ulna. Also a thinning of the ligament without rupture may occur. Some injury to the internal ligamentary apparatus is necessary for the production of this fracture in most cases, and in a certain number can be assumed to be the first act in the entire fracture mechanism, since only after the tearing of this ligament which prevents the deviation of the hand to the volar side, can the carpal bones come completely under the posterior border of the radius and exert their full power.

After fracture, if the force continues to act, the lower fragment takes a dorsal and radial displacement, and tends to a more supinated position than the upper. This position is maintained by interlocking of the fragments, and also by muscular action on the dorsal side. This latter action can be readily visualized when the close connection of the extensor tendons with the lower end of the radius is considered. The action of these muscles is concentrated on the fragment as soon as fracture occurs.

Much more might be said in the discussion of these various theories, but to do so would unduly prolong an already sufficiently lengthy paper. For the same reason, I shall not attempt to take up the associated pathology which is always present in every fracture to a greater or less degree. Such associated pathology consists in hæmorrhage between fascial planes, laceration of muscles resulting in hæmatomata, serous exudates into tendon sheaths richer in fibrin if tendon is injured, torn ligaments, inflamed synovial membranes, hæmarthrosis, etc. All these conditions must be considered in the treatment.

DIAGNOSIS AND TREATMENT

The diagnosis likewise need not detain us long. The characteristic "silver-fork" deformity is well known, and the X-ray, which should always be used, in the great majority of cases makes known with certainty the condition present. In this connection, note

that occasionally a case of injury in the region of the lower end of the radius will present itself with localized bone or "pencil" tenderness, considerable swelling which appears at once, and subcutaneous ecchymosis after 24 to 48 hours, in which case the X-ray is negative. Under such circumstances, the X-ray should not be held conclusive, but the case should be treated as a fracture.

Let us now briefly take up the treatment. The successful treatment of all fractures requires good judgment, common sense, constant attention to details, and the election of a method which in the individual case will lead to a restoration of the form and function of the injured limb in the shortest possible time, with the least danger and inconvenience to the patient. In the treatment of fractures of the lower end of the radius, two things are of equal importance. The first is early, complete reduction, and the second is careful, painstaking after-treatment, in which massage and passive motion play a prominent rôle, and in which the use of splints is not abused.

Some reduction is necessary in practically every case of complete fracture of the bone across the lower end. A cursory examination of the X-ray may show apparently no displacement, and there may indeed be none as regards the position of the ends of the two fragments. In such a case, particular attention must be paid to the plane of the carpal articulating surface of the radius. If this is not in proper position, the result will be a functionally imperfect wrist. Normally, this surface is tilted slightly forward; in the case of fracture, it is tilted backward to a greater or less degree, as a result of condensation of bone on impaction on the posterior aspect of the fracture. This must be corrected if the result is to be successful.

For reduction, a general anæsthetic should always be employed. The wrist should then be placed in a position of extreme hyperextension. This immediately relaxes the muscles, tendons and periosteum, if it has remained untorn, as is sometimes the case, and allows any impaction present to be broken up by manipulation; the lower fragment is then forced into position by pressure over it. Once reduced, the displacement shows little tendency to recur.

For a permanent dressing, light anterior and posterior wood splints are very satisfactory. Plaster-of-Paris has no place in the treatment of this fracture. The anterior splint should be cut out to allow for the thenar eminence; the posterior one cut out for the head of the ulna. Both should be well padded. They are applied with the hand and arm in a position half-way between pronation and supination, with the hand slightly adducted; they are held in place by adhesive plaster strips, and a bandage put over all. The arm should now be perfectly comfortable; any marked pain, any throbbing, any blueness, coldness, or numbness of the fingers, is an indication that the dressing is too tight, and the condition should be immediately remedied. The patient should be informed of this, and instructed to report any of the above signs or symptoms at once, should they appear. If possible, he should be kept in the hospital for the first day or so under constant supervision. In any event, if this cannot be done, the dressing should invariably be inspected within 24 hours following its application.

The after-treatment of the fracture now begins, and it is just as important as the primary treatment. A good functional result after a fracture, even with some anatomic defect, is better surgery than a perfect anatomic result with ankylosis in a very short time, and since forcible movements should not be employed to break up joint adhesions for from 2 to 3 months after the injury, it is important to prevent adhesions from forming. The early and intelligent use of massage and passive motion is the best way to accomplish this end. These two measures properly used, aid absorption of periarticular and joint effusions, prevent atrophy and weakness, hasten healing, and lessen joint and tendon sheath adhesions and ligament contractures.

This treatment should be begun by the third, or at the latest, the fourth day, using the utmost gentleness. The dressing should be removed completely, and very light massage and very slight passive motions instituted. For the first sitting, five minutes

of this is sufficient, and absolutely no pain should be caused; the dressing is then replaced. This same procedure is repeated every other day, at each sitting lengthening the time of massage a trifle, and slightly increasing the amplitude of the passive motions, always being extremely careful to avoid giving rise to any pain whatever. If the treatment can be carried out daily, so much the better; usually every other day will have to suffice. The anterior splint may be discarded altogether by the tenth day, and by the fourteenth, the patient may begin gentle active movements, in addition to the passive ones. A few days later, or by the end of the third week, the posterior splint may be taken off, a firm supporting dressing of gauze and adhesive being applied about the wrist at the site of the fracture. The sling, however, should be retained, and the patient instructed as to how to carry the arm in it in the absence of splint control of the position of the arm; the latter is held in the mid-position between pronation and supination, and the edge of the sling comes just below the lower end of the ulna, so that the hand and wrist, by their weight, naturally assume an adducted position. Passive and active motions and massage should still be continued, as outlined.

By the end of the fourth week, union should be firm enough for the patient to begin to use the wrist for light household tasks; however, this early activity should involve absolutely no strain on the newly formed bone at the site of fracture. The average patient should be able to return to light manual labor at the end of 6 to 8 weeks; but full, heavy work, involving marked strain and stress on the wrist, should not be attempted before the tenth or twelfth week.

In conclusion, operative treatment of fractures in this situation is practically never indicated in recent cases, as the treatment outlined will give just as good functional results as could be obtained by any other means. But in neglected cases, and cases in which the final result is far from satisfactory, surgical treatment of some sort may be indicated. During the first three weeks, whatever union has taken place can usually be broken up by manipulation under an anæsthetic, and the case then treated as an open fracture. After the third or fourth week, an open operation will be necessary. At this time, an osteotomy in the line of fracture, followed by treatment appropriate for a recent fracture will give the best results (Lathrop, 21). In fractures which have existed for several months, too much cannot be promised from operative interference. Deformity may be corrected, although after 6 or 8 months, this is sometimes very difficult; and even after correction of deformity, function frequently is not improved. Each case should be studied very carefully, and cases for surgical interference selected only after all factors involved have been considered.

SUMMARY AND CONCLUSIONS

1. Fractures of the lower end of the radius are among the most frequent with which the general practitioner has to deal, and as such, are very frequently not given the care they deserve, with a consequent increase in the proportion of unsatisfactory end-results.

2. These end-results can be improved if more attention is given to the details of treatment and after-treatment.

3. A thorough knowledge of the anatomy of the parts and the mechanism of the usual fracture is essential to proper treatment. The anatomy is reviewed, and various mechanisms described.

4. It is probable that no one mechanism will satisfactorily account for all cases. These mechanisms fall into three general classes, depending upon direction and mode of transmission of the active forces.

5. Any of these, or combinations of them, may be active in any given case.

6. Successful treatment of these fractures consists in immediate, complete reduction, preferably under an anæsthetic, and early passive motion and massage.

7. Operative treatment, as a rule, is indicated only in old, badly treated or untreated cases.

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CLINICAL AND SURGICAL ASPECTS OF RENAL NEOPLASMS[1]

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IN an article published in 1920, the author reported observations based on an analysis of forty tumors of the kidney. During the intervening 4 years there have been 30 additional cases, so that the present review embraces a clinical study of the entire group of seventy renal neoplasms.

The histories of these patients have been carefully studied with the view of determining various factors of importance. For instance, it is of interest to know whether the early onset of initial symptoms (pain and hæmaturia) generally implies a correspondingly incipient pathological lesion. Is the prognosis in general better in apparently early cases (as determined by symptomatology)? The question of vein involvement is an interesting one; whether extension into the renal vein is a late or early occurrence, and its influence on the end-result. Are present-day methods of examination precise enough to detect this disease in its incipient stage? Is exploratory operation justified in doubtful cases? These and other problems that presented themselves will be considered.

A patient with the classical symptoms of renal neoplasm, namely, pain, hæmaturia and tumor, offers no diagnostic problem, the condition is already manifest. Based on such a triad of symptoms, one would say that the diagnosis of kidney tumor offers no difficulties. Unfortunately, renal neoplasms may present such a protean clinical picture as to render the diagnosis a most difficult one. Kroenlein has stated that an early diagnosis of renal neoplasm can be made in only 5 per cent of cases. Perhaps our chief problem is the differentiation of the hæmaturia of renal tumor from the so-called essential hæmaturias. Despite the most careful application of all our resources, we are occasionally left in doubt, and exploration of the kidney alone will make it possible to decide the issue.

Pathologically, the 70 cases may be classified as follows:

	Cases
Hypernephroma	44
Carcinoma	7
Papillary carcinoma pelvis	5
Granuloma	1
Sarcoma	2
Mixed tumors (Wilms)	10
Angioma	1
	70

Hypernephroma is the predominating type of kidney tumor. This corresponds with reports of other authors, who found that in a collected series of 443 cases, 287, or 64 per cent were of this type. Of the 70 patients, there were 60 adults and 10 young children under 9 years of age. The clinical differentiation between the various pathological varieties of kidney tumors is often impossible, although there are some distinguishing characteristics. With the exception of neoplasms occurring in children which will be considered separately, all the tumors will be classified pathologically and symptomatically as a whole. The age incidence of the 60 adult patients was as follows:

	Cases
10 to 20 years	0
20 to 30 years	2
30 to 40 years	10
40 to 50 years	16
50 to 60 years	20
60 to 70 years	11
70 to 80 years	1

More than 50 per cent of our cases occurred during the fourth and fifth decades. These statistics coincide with those reported from other clinics. As regards sex, fifty were males, twenty females. The right kidney was diseased thirty-eight times, the left, thirty-two. Large series of cases show but slight differences in the side affected. Calculi were found associated in three instances. In one of these cases, malignancy was not suspected, a diagnosis of calculus having been established. At operation, a suspicious looking area in the cortex was discovered, and specimens removed were reported adenocarcinoma. The kidney was subsequently extirpated. The associa-

[1] From the Surgical Service of Dr. Edwin Beer, Mt. Sinai Hospital. Read before New York Urological Society, October 29, 1924.

tion of stone with tumor has been reported by Albarran and Imbert (1), who collected 26 such cases, and by Coryell (3), from the Mayo Clinic, where calculi were found nine times in 149 kidney tumors. The majority of calculi were found in the group of papillary carcinomata of the pelvis.

SYMPTOMATOLOGY AND CLINICAL COURSE

The classical or primary symptoms of kidney neoplasms are pain, hæmaturia, and tumor. Later on cachexia develops, metastases appear, and evidences of venous stasis, the result of tumor compression, manifest themselves. Early cases may present only one or a few of these symptoms, so that the clinical picture is by no means a clear one. The presence of all the classical symptoms generally denotes a lesion well advanced.

A study was made to determine the most prominent initial symptoms, and the time of its onset prior to seeking medical advise. Of 60 adult patients, hæmaturia was noted first in 21 instances. In 9 cases, the initial hæmaturia was as recent as 6 days whereas in the majority it dated back weeks, months, and at times, years. Pain, as an initial symptom, was present 18 times, and not infrequently antedated the appearance of hæmaturia by many months, and in a few instances, years. Pain and hæmaturia appeared simultaneously seven times. Five patients complained of loss of weight, extending over a period of months, before the onset of other symptoms. Two patients noted urinary difficulties, such as frequency and attacks of retention, as the prodromal symptoms. Gastric complaints predominated three times, and in two cases, metastases appeared before there was any suspicion of a renal condition. Increasing abdominal enlargement first called attention to the condition in two instances.

INITIAL SYMPTOMS—60 ADULT CASES

	Cases	Per Cent
Hæmaturia	21	36
Pain	18	30
Hæmaturia and pain	7	10
Loss of weight	5	8
Increased size of abdomen	2	3
Urinary difficulties	2	3
Gastro-intestinal complaints	3	3
Metastases	2	3

It can thus be seen that many months before classical symptoms (pain, hæmaturia, and tumor formation) develop, there are in about 23 per cent of cases, other forerunners of impending trouble, symptoms which are associated with many conditions besides renal neoplasm. The relative frequency of the individual symptoms may be tabulated as follows:

TOTAL ADULT PATIENTS—CASES 60

	Cases	Per Cent
Hæmaturia present sometime during course of disease	48	80
Tumor	45	75
Pain	40	66
Loss of weight	20	33
Cachexia	15	25
Metastases	12	20
Fever	8	13

Hæmaturia is the predominating symptom, and probably the most important, from a diagnostic point of view, as it immediately directs the notice of the patient and physician to the urinary tract as the seat of the trouble. In most instances, the bleeding is intermittant in character, and ceases without medical attention, thus serving to lull the patient into a sense of false security. The intervals between the attacks of bleeding range from weeks to years. According to Danaclara (4), the hæmaturia associated with hypernephroma is not a prolonged one as in bladder tumor or other conditions; in but one case of a series of 146 cases did the bleeding persist as long as 2 weeks. The bleeding at times is very profuse, instances having been recorded in which one hæmorrhage proved fatal. Blood casts of the ureter are not infrequently seen, and have been demonstrated cystoscopically, protruding from the ureteral orifice. The bleeding may be only microscopic for a long time, before a macroscopic hæmorrhage takes place. The hæmaturia is generally painless, except when blood clots occlude the ureter, producing typical attacks of ureteral colic. Tumor formation was present in 75 per cent of the cases. The size of the growth varied from a small, movable tumor, to a very large, dense, adherent mass. Characteristic of renal tumor is a hard, nodular surface. Small growths, especially when situated in the upper pole, and hidden behind the ribs, are fre-

quently overlooked. Bimanual palpation, with the patient in the lateral position, helps materially in outlining the tumor. Attention is here called to the danger of rough palpation, as hæmorrhage may be produced, and the possibility of squeezing tumor cells into the general circulation must also be considered.

Pain was the third most frequent symptom. In analyzing this symptom, a number of interesting facts were brought to light. In the first place, as previously mentioned, pain in 18 cases preceded other manifestations, by weeks, months, or years. The location of the pain is variable, and often impossible to associate with a renal condition. The pain, caused by the passage of blood clots, is colicky in nature, and immediately attracts attention to the kidney. The pain not associated with bleeding, may be a dull, lumbar ache, or a sharp neuralgia, following the course of distribution of the ileo-inguinal, and genito-crural nerves. A few patients complained of so-called "severe lumbago," others of an intractable sciatica, or mild abdominal cramps. Attacks of lumbago or sciatica in patients of advanced years which do not yield to the usual methods of treatment, should make one suspicious of the possibility of a renal neoplasm. Severe neuralgic lumbar pains have been described in cases in which the growth has broken through its capsule.

TABLE SHOWING APPEARANCE OF CARDINAL SYMPTOMS (PAIN AND HÆMATURIA) PRIOR TO OPERATION

Pain

	Cases
1 day	1
2 days	3
5 days	2
6 days	2
7 days	1
2 weeks	1
3 weeks	3
5 weeks	2
6 weeks	1
1 month	3
2 months	4
3 months	2
4 months	1
5 months	3
6 months	2
7 months	3
8 months	1
9 months	1
10 months	1
1 year	6
1½ years	1
2 years	2
3 years	2

Hæmaturia

	Cases
3 days	1
1 week	1
2 weeks	1
2 months	1
3 months	2
5 months	1
1 year	2
1¼ years	1
2 years	1
3 years	1
5 years	1

In six cases time of onset of pain could not be given.

Loss of weight was noted in at least 33 per cent of cases. In 5 patients, this was the only symptom observed for some time previous to the appearance of any of the classical signs.

Cachexia, generally a late manifestation, was present fifteen times; most of these cases had advanced lesions with metastases. Many patients, however, with well advanced lesions and renal vein involvement, looked remarkably well. A form of cachexia has been described appearing early in the course of the disease, before the onset of hæmaturia and tumor. In such instances, the differential diagnosis between renal tumor, tuberculosis and other chronic disorders may be most difficult, especially when fever is present.

METASTASES

Twelve patients, or 20 per cent, already had metastases when first observed. In two instances, the metastases dominated the clinical picture, no suspicion being entertained of a renal lesion. In the first case, the patient's pulmonary symptoms were diagnosed as tuberculosis, later on as a primary lung neoplasm. Months after, a profuse hæmaturia immediately cleared up the situation. In the other case, a small tumor over the tibia was removed, and found to be a metastatic hypernephroma, thus first directing attention to a kidney tumor. A number of cases have been reported in the literature in which the metastases have appeared long before the advent of renal symptoms. The points of predilection for secondary deposits are the lungs, long bones, liver, and brain. Metastases into the small intestine have been described as a rare occurrence. Carcinoma of the kidney also metastasizes along the course of the ureter, and into the bladder. Involvement of the retroperitoneal glands in the region of the kidney was found four times in 60 cases, three times in carcinoma, one in hypernephroma. Fever ranging between 100 and 102 degrees was observed eight times without the presence of pus in the urine. Israel (5) first called attention to this symptom, and found it present in 57 per cent of his cases. He considers it due to toxic products, generated by the tumor, and independent of any infection in the growth or

urinary tract. As can be readily seen, its presence in cases without tumor formation and hæmaturia, may tend to confuse the diagnosis.

The symptoms above described may be classified as primary, and are the ones most frequently present during the course of this disease. Secondary manifestations, due mainly to the effects of pressure of large tumors on various organs and blood vessels, are not infrequent. Varicocele, especially when it appears on the left side, has been described as a diagnostic symptom of renal tumor. It differs from idiopathic varicocele in that it does not disappear on lying down, and is due either to pressure or thrombus formation in the spermatic vein. We have not observed this phenomenon in any of our cases. Œdema of the lower half of the abdomen and legs pigmentation of the skin, as in Addison's disease, and increased blood pressure, due to abnormal adrenalin secretion may also be classified as secondary symptoms.

DIFFERENTIAL DIAGNOSIS

Rovsing has classified the symptomatology of renal neoplasm, in relation to diagnosis, under three headings.

1. Cases with palpable tumor and hæmaturia,

2. Cases with palpable tumor without hæmaturia,

3. Cases with hæmaturia without a palpable growth.

1. Palpable tumor and hæmaturia. This group is, of course, the easiest to diagnose, as the hæmaturia immediately focuses attention to the kidney. Only a few conditions, such as stone and tuberculosis, need be considered in the differential diagnosis.

2. Palpable tumor without hæmaturia. It will be necessary first of all to determine whether the tumor in question is renal in origin or not. This may require various examinations, such as colon inflation, roentgenography of the gastro-intestinal tract, and pyelography. Renal tuberculosis, hydronephrosis, pyonephrosis and calculus are readily differentiated. Occasionally, a tumor may be associated with either of the latter conditions as happened in two of our cases. In neither instance was the presence of a growth suspected. Echinococcus cyst of the kidney may present the same palpatory finding, i.e., a hard, irregular surface, so often noted in tumors. Tumors of the adrenal may simulate renal growths, and differentiation be impossible without exploration. Polycystic disease, especially when only one kidney is palpable, may offer considerable difficulty in the differential diagnosis.

3. Cases with hæmaturia, without tumor. This group presents the greatest difficulties in diagnosis. Even after the most painstaking studies, embracing all our known procedures, it will occasionally be impossible to differentiate the bleeding of tumor from the so-called "essential hæmaturia." We have explored at least a half dozen cases diagnosed, however, as belonging to the essential hæmaturia group, in which doubt existed in our minds as to the accuracy of our observations. Under such circumstances, exploration of the kidney is always justified.

CLINICAL AND UROLOGICAL DIAGNOSTIC PROCEDURES

Abdominal inspection in early cases generally yields no information, large tumors are readily noted, as is also pigmentation of the skin, varicocele, and œdema. Palpation gives more valuable data concerning the consistency, surface contour, and mobility of tumor. Bimanual examination, with the patient in the lateral position, is a valuable procedure. Probably more than 80 per cent of renal growths can be palpated by this method. The importance of a careful urinalysis cannot be too strongly emphasized, especially if there is only microscopic blood. Tumor cells were found in two of our cases in catheterized kidney specimens, and a correct diagnosis of malignancy made. Ordinary roentgenography by outlining the size and shape of the kidney will often prove of value. In 15 cases distinct enlargement and irregularity of the kidney outline was observed. In a few cases, we have been justified in excluding malignancy by roentgenograms, showing a perfectly normal kidney shadow. With perirenal oxygen insufflation, we have had no experience although the German literature mentions this as a

valuable aid in outlining renal shadows. Inflation of the colon gives information as to the retroperitoneal position of the growth, small tumors as a rule lying posterior to the colon, large ones displacing the colon mesially. Gastro-intestinal roentgenography may also help in localizing the growth.

Functional tests, phthalein, and indigocarmine and blood chemistry estimations, whereas of value in determining the functional capacity prior to operation, are not in themselves of diagnostic importance, because similar findings may be obtained in other conditions. In our series all but a few cases showed a diminution or absence of indigocarmine output on the diseased side. It is conceivable that with a small growth, the tests may be not at all conclusive. Observation cystoscopy yields valuable information, especially where a bloody efflux is noted. Both meatuses should be observed before the ureters are catheterized, as traumatic bleeding may be produced by the catheters. In a few cases, large blood clots were seen protruding from the orifice of the affected side. It was not unusual to note changes around the ureteral orifice of the diseased kidney, such as œdema of the meatus and submucous hæmorrhages. When examined in the hæmaturia-free interval, forcible manipulation of the ureteral catheter in the renal pelvis, with the idea of traumatizing the growth and producing an active hæmorrhage, has occasionally aided in determining the source of the bleeding. The wax bougie is a valuable diagnostic aid in differentiating the bleeding of tumor from a calculus which fails to show in the roentgenogram.

Pyelography. The knowledge obtained by means of pyelography is of inestimable value in the diagnosis of renal neoplasm, in fact it may be said without contradiction, that it is probably the most important diagnostic method at our disposal. Kidney tumors, sooner or later in the process of their development, produce malformations of the renal pelvis or calyces which become manifest in the pyelogram, by rather characteristic distortions. The type of tumor cannot always be determined by the pyelogram, but this is not of importance. The fact is that this method gives us information which may render it possible to diagnose early malignancy, perhaps before the advent of classical symptoms.

At the time of our previous communication, pyelography was not as frequently practised as it is now when every case of renal hæmaturia is subjected to this examination. Pyelography should also be indicated in all cases of renal pain, in the absence of definite lesions, such as stone, tuberculosis, etc. Pyelograms of kidney tumors are often so varied and bizarre in appearance that it would require too much time at present to describe the manifold changes encountered. Braasch, in his excellent monograph has ably depicted them. Suffice it to say that distortion, elongation, and retraction of the calyces, obliteration of one or more calyces, and filling defects of the pelvis resulting in narrowing and partial obliteration, are the most characteristic. Large tumors may cause a displacement of the pelvis with marked ureteropelvic deformities. The interpretation of the pyelogram is not always a simple matter. It may be impossible to differentiate between a large retroperitoneal mass (myxoma, or sarcoma, or gland) and a kidney tumor, either by pyelography or cystoscopy. The kidney, as a result of compression by the mass, may have an inhibition of function, thus simulating a renal condition. Pressure may so distort the organ as to produce pyelographic changes similar to those seen in renal neoplasms. We have had a few cases in which it was not possible to determine from the cystoscopic findings and the pyelograms, whether or not the tumor was a renal neoplasm. In both instances, the tumors proved to be retroperitoneal growths. The pyelographic changes produced by polycystic kidneys may resemble those of renal tumor. When in doubt, the other kidney should be injected, for polycystic disease is generally bilateral. Filling defects, due to a stone which fails to show in the roentgenogram, and the presence of blood clots in the pelvis, may occasionally cause some confusion. In 23 cases in which pyelograhy was done, there were positive findings indicative of renal neoplasm, twenty-one times; two pyelograms were considered doubtful. This will serve to illustrate the value of pyelography.

Fig. 1. Cancer of kidney, filling defect in pelvis and irregularity of calyces.

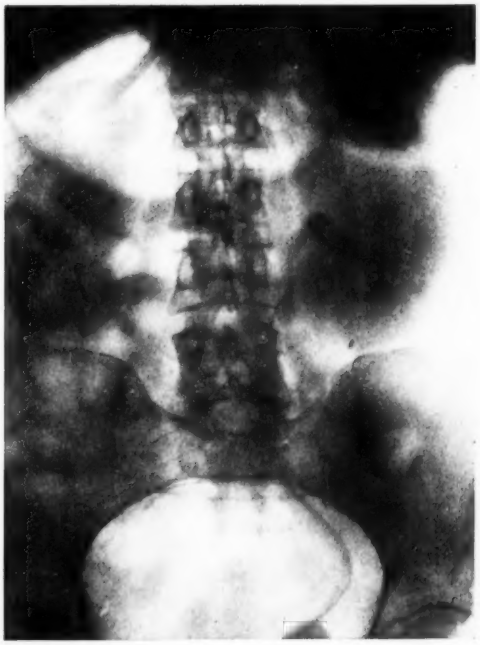

Fig. 2. Hypernephroma showing obliteration of calyces, with pelvic deformity.

DIFFERENTIAL DIAGNOSIS OF THREE TYPES OF KIDNEY TUMORS: HYPERNEPHROMA, CARCINOMA, AND PAPILLARY CARCINOMA OF RENAL PELVIS

The differentiation of the three main types of kidney tumor is often impossible, although a careful study of the symptoms, clinical findings, cystoscopic and roentgenographic examinations will occasionally make this feasible. Suggestive of hypernephromata are its frequency (60 to 80 per cent of kidney tumors), slow progress in early stages, late cachexia, single metastases, pigmentation of skin, history of lumbar pain, often extending over the course of a few years and long intervals between attacks of hæmaturia.

Carcinoma runs a more rapid course, tumors do not generally attain such a large size as hypernephroma, cachexia appears early, and calculi are more often present than in cases of hypernephroma. Metastases are multiple.

Papillary carcinoma of renal pelvis. During the past few years, reports of this condition have become more frequent. There were five cases in our series, four carcinomata, one sarcoma. Tumors of the pelvis are characterized by a hæmaturia generally very profuse and with short intervening periods. Bladder metastases in the region of the ureteral orifice are seen in this type of growth rather frequently. A unilateral, renal hæmaturia, associated with a bladder tumor, points strongly to a primary papillary tumor of the pelvis. Intermittent hæmatonephrosis, due to obstruction of the ureter by clots, is rather characteristic. Following the passage of the obstructing clot, large quantities of bloody urine which may contain tumor fragments are passed. There is usually more marked pelvic dilatation, as evidenced by the pyelogram in tumors of the renal pelvis. Calculi are found associated not infrequently; in our series, three times.

TUMORS OF KIDNEY IN CHILDREN

Malignant tumors of the kidney in children are rather uncommon. According to statistics

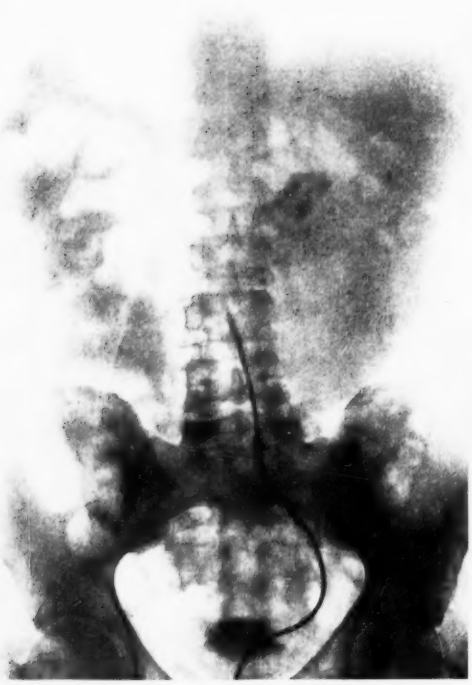

Fig. 3. Hypernephroma showing obliteration of all calyces with pelvic deformity.

Fig. 4. Papillary carcinoma of kidney, filling defect of pelvis.

embracing large series of cases, they occur about four times less frequently than in adults. The Wilms or mixed type of tumor predominates. These growths are supposed to take origin in embryonic tissue, and are composed of collections of epithelium, in the nature of tubular or glandular structures, containing besides smooth and striped muscle fibers, cartilage, fat, bone, and proliferating connective tissue of mesothelial origin.

In a collected series of 165 mixed kidney tumors, 131 appeared within the first 6 years of age. The sex, age incidence, and side involved in our group was as follows:

	Sex	Age	Side
1.	Male	6 years	Left
2.	Male	3 years	Left
3.	Female	2½ years	Left
4.	Female	3 years	Right
5.	Female	3 years	Right
6.	Male	17 months	Right
7.	Female	2¾ years	Left
8.	Female	6½ years	Right
9.	Male	9 years	Right
10.	Male	9 months	Bilateral

The Wilms tumor is occasionally seen in adults. One of our patients was a girl, 22 years of age. The relative frequency of Wilms tumor in children compared with hypernephroma and carcinoma, is shown in the following table (Albarran).

Children	Adults
49 Mixed tumors	10 Mixed tumors
5 Hypernephromata	85 Hypernephromata

In a large series, the sex incidence and side involved, are about equal. The tumors are bilateral in 4 per cent of cases. Walker (10) reports 10 bilateral tumors in 141 cases.

Clinically, tumors of the kidney in children manifest themselves by characteristics, distinctly the opposite from that of adults. The first symptom, noted in many instances, is the presence of a large abdominal mass. The tumors may reach an enormous size, almost filling the entire peritoneal cavity and producing marked bulging of the abdomen. The child may look perfectly well, cachexia not appearing until later. Anæmia and gastrointestinal symptoms, with loss of weight, may

Fig. 5. Hypernephroma (showing filling defect in pelvis) and obliteration of lower calyx.

Fig. 6. Hypernephroma (distortion of pelvis and obliteration of calyces).

be the first manifestations noted. Examination then reveals a large intra-abdominal tumor. Pain is not a prominent symptom and, if present, is not severe. As contrasted with tumors in adults, hæmaturia is of infrequent occurrence, either as an initial symptom, or at any stage of the disease. In our cases, hæmaturia was present four and absent six times; in one, the bleeding was only microscopic. The diagnosis is not difficult. The same urological examinations practised in adults, as has been shown by different authors, can usually be carried out in children. Metastases are not common, local recurrences are. Death is generally caused by cachexia and local recurrence. The operative mortality is high, reports varying from 36 per cent to over 50 per cent. The transperitoneal route is usually employed on account of the large size of the tumors. Two of our cases were considered inoperable, one was explored and found inoperable, seven were nephrectomized. The prognosis, as to cure, is very bad, recurrences generally taking place within a year after operation. The ultimate mortality has been placed between 80 per cent and 90 per cent. In our series of eight operations, there was one postoperative death, a mortality of 12.5 per cent. Four patients died within 6 months, one within a year. Two cases could not be traced. One patient (hypernephroma) is alive and well, 6 years after. X-ray and radium from current reports in the literature, seem to offer but little encouragement.

THE RELATION OF EARLY SYMPTOMS AND PROGNOSIS TO PATHOLOGY AS FOUND AT OPERATION

The question naturally arises whether patients presenting themselves in the early stages of the disease, as determined by the appearance of the initial symptoms (pain and hæmaturia) have correspondingly incipient pathological processes. If so, is the prognosis better than in cases with a longer duration of such symptoms. A careful comparative study frequently proves that this is not true, as illustrated in the following group arrangement.

Group 1. Initial symptoms (pain and hæmaturia) appearing from 2 days to 2 months before operation.

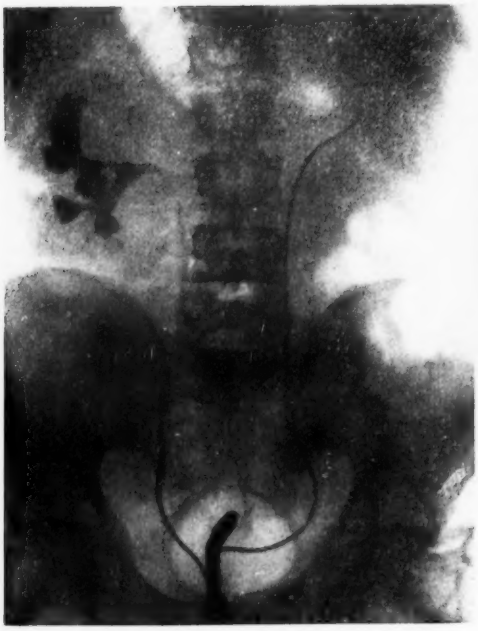

Fig. 7. Granuloma of kidney.

14 Cases

5 showed growth in renal vein.

1 showed growth in renal vein and vena cava.

1 showed retroperitoneal gland involvement.

8 of tumors, were large in size.

2 proved to be inoperable as determined by exploratory operation.

5 of these patients died within the year.

1 patient had metastases in lung.

Group II. Initial symptoms (pain and hæmaturia) from 6 months to 1 year.

12 Cases

5 showed growth renal vein.

2 showed retroperitoneal gland involvement.

Larger and more fixed tumors in this group.

3 proved to be inoperable as determined by exploratory operation.

2 patients died within the year.

Group III. Initial symptoms from 1 to 3 years.

15 Cases

All large growths.

Fig. 8. Carcinoma of pelvis; marked deformity of pelvis and calyces.

Four inoperable tumors, determined by exploratory operation.

More fixed growths.

Five deaths within year.

Two showed renal vein involvement.

In the majority of patients surviving operation, 2 to 4 years, the initial symptoms appeared from 5 months to 1 year previously. A number of patients who succumbed within a year, had initial symptoms of short duration, 6 days to 4 months.

OPERATIVE CONTRA-INDICATIONS

Having established a definite diagnosis, the question of operability is next to be considered. There are certain types of cases which, one knows from previous experience, are not suitable for operative interference. Large, fixed tumors, which have no mobility, are, as a rule, inoperable. In attempting to free the kidney, there is great danger of a fatal hæmorrhage, or of injuring the neighboring hollow viscera. In 2 cases of this type in which nephrectomy was done, the patients died from profuse hæmorrhage. In all of the exploratory operations, very large, fixed tumors were found. At the time, we were of the opinion that the patient was justified in receiving the benefit of an exploration, but found nephrectomy impossible. In this type of case, Federoff has ad-

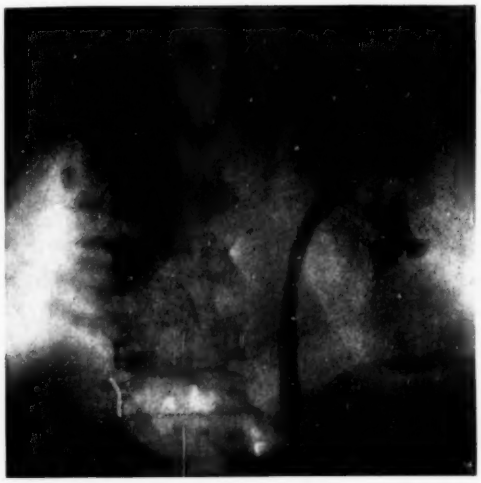

Fig. 9. Papillary carcinoma of kidney. Tumor in pelvis compressing the middle calyx.

Fig. 10. Carcinoma of kidney, defect in pelvis.

vised a subcapsular nephrectomy, excising the fatty and proper capsule after the kidney has been extirpated.

Metastases in relation to operative indication. Radical surgery, of course, is not to be considered, if multiple growths are found disseminated. Since single metastases readily react surgically (as has not infrequently been reported during the course of this disease), in the absence of cachexia, these should not contraindicate radical operation. The kidney should first be extirpated, followed as soon as possible by excision of the secondary growth. There are reports by Albrecht, Israel, Brenner, Colmer, Scudder, and others, in which patients have lived for years, following the removal of a secondary deposit. Occasionally, the metastases have been removed first, through a mistaken diagnosis, and the kidney subsequently extirpated. It is important that the lungs and bones should be X-rayed before operation for possible secondary deposits.

TREATMENT

There is only one recognized form of treatment and that is nephrectomy. Radium and deep X-ray are to be used only as adjuvants. Deep X-ray therapy occasionally is of value in inoperable cases, for controlling hæmaturia.

Lumbar nephrectomy is the usual procedure. In our adult series, there were forty-two lumbar nephrectomies, and five transperitoneal nephrectomies, the latter procedure being reserved for very large growths. Besides the usual oblique incision, a transverse lumbar incision has been recommended, dividing, if necessary, one rectus muscle. This incision gives a very good exposure. If a question arises as to the operability of a case,

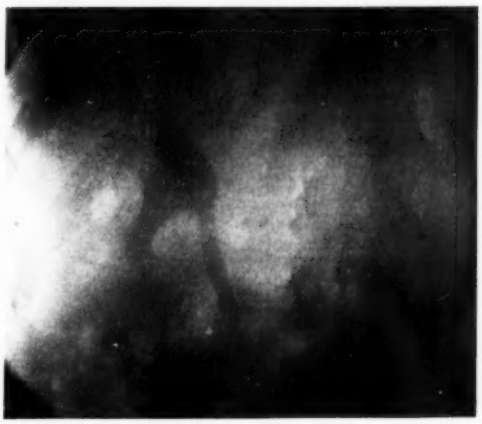

Fig. 11. Carcinoma of kidney, obliteration of upper and middle calyx.

Fig. 12. Hypernephroma showing marked deformity of pelvis.

Fig. 13. Polycystic kidney with retroperitoneal sarcoma.

it is advisable to open the peritoneum and examine the liver for metastases. The renal vein should be ligated as early in the operation as possible to prevent neoplastic tumor cells from being squeezed into the general circulation. It is important to excise entirely the fatty capsule of the kidney.

Operative mortality. The published statistics vary, from 11 per cent to 33 per cent. Transperitoneal nephrectomy has a higher mortality because of the fact that the peritoneum is opened and that we are dealing with more advanced lesions for which this type of operation is reserved. Most of the deaths are caused by cardiac failure, pneumonia, peritonitis, and uræmia. Cardiac failure has been mentioned as the cause of death in an unusually high percentage of cases (66.7 per cent: Israel, 5). Israel attributes this to a toxic myocarditis, caused by the breaking down of hypernephroma tissue and notes that it is more frequently observed in cases in which the vena cava has been invaded by the growth. In the majority of instances of cardiac death, there were no previous evidences of cardiac disease. In our series of 47 nephrectomies in adults, there were 3 deaths, a mortality of 6 per cent.

Renal vein involvement. Twenty cases showed extension of the growth into the renal vein; a few into the vena cava. This complication, although occurring in carcinomatous growths, is more characteristic of hypernephromata. Reports from various clinics as to its frequency vary from 10 to 22 per cent. Involvement of the renal vein, even though rather extensive, does not necessarily indicate a fatal prognosis. One would imagine that once the tumor had invaded the vein, early metastases must be inevitable. Numerous instances have been cited in which patients have survived for years following the removal of hypernephromatous plugs from the renal vein and vena cava. Albrecht (2) reports one patient alive 4 years, and one, 12 years; the

Fig. 14. Uric acid calculus in pelvis, (showing filling defect which may be confused with a pelvic tumor).

Fig. 15. Large retroperitoneal sarcoma, distortion of pelvis and obliteration of calyces simulating tumor of kidney.

Mayo's (6), 5 and 14 years after this procedure. At least 10 patients in our series with renal vein involvement have survived operation, from 1 to 5 years. The vein was found thrombosed five times in the group of 14 patients in whom the initial symptoms had manifested themselves only a short time previous to operation. In going over the case histories, it was surprising to find such a high percentage in what were thought to be early cases.

Procedure in renal vein involvement. The renal vein is opened and the thrombus which occasionally extends into the cava, is carefully and gently removed. It may be necessary to make an opening into the cava, in order to extract all of the growth. In one of our cases a small incision requiring a suture was made in the cava to aid in extracting the thrombus. When the growth is firmly attached to the wall of the cava, excision of part of the vein has been advocated followed by lateral suture. E. Rehn (7) has lately reported such an instance, and gives details as to the various operative procedures to be employed in excising these growths from the wall of the vena cava.

PROGNOSIS AND REMOTE RESULTS

The prognosis in general is bad, death occurring from recurrence, cachexia, or metastases, often as late as 10 years after operation. Many such late recurrences have been reported. The majority of deaths occur within 2 years following operation. A three-year period by no means insures a favorable prognosis, as a number of our patients survive this period of time only to develop metastases a year or so later. The percentage of cures varies considerably, as the following statistics show.

Israel, in 34 patients, reports 18 deaths from recurrence or metastases within 2 years; Garceau, in 43 patients, 39 deaths from recurrence or metastases within 3 years; Cunningham, in 31 patients, reports that only 9 had passed three-year period. Kuester had 11 per cent cures at end of 4 years; Braasch 27 per cent cures at end of 3 years, and 10 per cent cures at end of 4 years. Pleschner reports 17 per cent cures at the end of 3 years; and 4.8 per cent cures at end of 5 years. Berg

reports 25 cases, all dead within 7 years. Paschen collected 268 cases, only 17 per cent were free from recurrence after 3 years.

From these and other statistics, it can be seen that the percentage of three-year cures averages 20 and 30 per cent, five-year cures probably less than 15 per cent, thus evidencing the extreme malignancy of renal neoplasms. In a recent report from the Mayo Clinic (8), embracing a large series of kidney tumors (243 cases), an attempt was made to correlate the postoperative data with the pathological data, so as to determine the mortality rate accompanying the different types of tumor. Time does not permit a discussion of this study which seems to be a very comprehensive one.

ADULT STATISTICS

Patients operated upon	52
Nephrectomies	
Lumbar	42
Transperitoneal	5
Exploratory operations	5
Deaths following nephrectomy	3
Deaths following explorations	1

DATA OBTAINABLE IN 42 CASES POSTOPERATIVE

Deaths	Cases
First year	18
Second year	2
Fourth year	1
Fifth year	2
Alive	
6 to 10 months postoperative	4
1 year	4
1½ years (lung metastases)	1
2 years (one with local recurrence)	2
2½ years (one with local recurrence)	2
4 years	4
5 years	1
7 years	1
	Per Cent
Approximate percentage three-year cures	26
Approximate percentage four-year cures	20
Approximate percentage five-year cures	9

DEEP X-RAY AND RADIUM TREATMENT

I have seen no statistics on the influence of the X-ray and radium on renal neoplasms, and our own are not extensive enough for us to formulate any definite conclusions. We have had no experience with the X-ray in the pre-operative preparation of patients. Of the patients surviving operation, 8 had been treated with X-ray or radium. Three of these had radium implanted, deep into the wound, near the pedicle, soon after operation; the other five were treated after operation with deep X-ray. The patients so treated did not seem to do better and the percentage of lasting results is no higher than in the first series of 40 patients, who were not treated with X-ray. In fact, of six patients who have survived operation over 4 years, but one was so treated. One patient who had received more than 12 treatments, developed a local wound recurrence within a few weeks after the cessation of treatment.

Total Number of Cases Treated with X-ray or Radium 14

Cases	Alive Post-operative	X-ray or Radium
4	6 to 10 months	3
4	1 year	1
1	1½ years	0
2	2 years	1
2	2½ years	2
4	4 years	1
1	5 years	0
1	7 years	0

CONCLUSIONS

In conclusion I wish to call attention to the extreme malignancy of kidney tumors, the difficulty of early diagnosis, the disproportion between early symptomatology and pathological findings, and the importance of pyelographic data. Whereas early diagnosis, based on classical symptoms does not necessarily indicate a favorable prognosis, extension into the vein does not render the prognosis hopeless. The ultimate mortality ranges between 65 and 75 per cent, and the only way to effect a reduction of this high rate at present would be to use the cystoscope and make pyelograms, not alone in every case of hæmaturia, but in every case in which the patient complains of lumbar pain for which no definite cause can be found, and to examine more carefully patients complaining of intractable sciatica and lumbago.

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NON-CARCINOMATOUS TUMORS OF THE STOMACH[1]

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NON-CARCINOMATOUS tumors of the stomach, although much less common than cancers of this organ, are nevertheless of considerable surgical importance because they can be recognized in the vast majority of instances only by exploratory operation and because removal of the tumor may not only result in permanent relief of symptoms but may also prevent malignant degeneration and the occurrence of complications which might result fatally. In spite of this importance, from a diagnostic as well as a curative standpoint, comparatively little is written on the subject in the textbooks so that one may gain the impression that non-carcinomatous tumors of the stomach, instead of being of considerable clinical importance, are rather more of a pathological curiosity. In order to correct this possible misconception, we have made a careful survey of the literature on this subject, and we wish to describe our experiences with a series of cases of non-carcinomatous tumors of the stomach consisting of 1 case of myofibroma, 2 of polyps, 1 of adenoma *en nappe*, 1 of hypertrophic pyloric stenosis in an adult, as well as the inflammatory tumors such as syphilis of the stomach and the inflammatory enlargement of the pancreas associated with peptic ulcer.

MYOFIBROMA OF THE STOMACH

Myoma or myofibroma of the stomach is not so uncommon a condition as one may suppose by reading the ordinary textbooks on the pathology of this organ. Nasetti (16) was able to collect 140 cases up to 1919, of which number 38 had undergone malignant degeneration. E. L. Hunt (8) in 1923, was able to add 9 more such cases from the literature, making a total of 149 reported cases up to that year. The importance of this condition does not depend entirely upon the diagnosis of the tumor *per se* or its possible removal, with the probability of permanent cure, but upon the fact that a large proportion undergo malignant degeneration or may cause complications which may result fatally. As previously mentioned, Nasetti found that more than 27 per cent of myomata or myofibromata of the stomach had undergone malignant degeneration and there was some doubt at first in our own case if sarcomatous degeneration had not already set in. The complications which may produce a very acute clinical picture or may even result in death are chiefly hæmorrhage and pyloric or duodenal occlusion by the tumor mass. Severe hæmorrhage, without other symptoms, is reported by F. Erkes (7), E. Weber (24), and N. Kleiber (9). Intermittent vomiting and hæmatemesis were reported by J. H. Outland and L. Clendening (19). An acute, clinical picture with severe pain and collapse was reported by E. Neuber (18) and J. E. G. Calverley (5), while a more prolonged course was reported by J. B. Camp (6), and E. L. Hunt (8). The case we report is of interest because operation resulted in a cure and because it illustrates the difficulty of diagnosis of myoma of the stomach, chiefly because it occurs usually between the ages of 50 and 70, and is, therefore, often mistaken for carcinoma until operation reveals the true nature of the condition.

J. E., a white male, age 57 years, a hardwood finisher by trade, entered the medical service of the County Hospital on August 3, 1924, with a complaint of having been ill for 8 months prior to admittance. He had severe epigastric pain which was constantly present but became worse 2 or 3 hours after meals, three times a day. There were also moderate constipation and a loss of 10 pounds in weight in the last month of his illness. Nausea, vomiting, or blood in the stools were never present. There was nothing of importance in his past or family history which would have any bearing on his present complaint.

[1] Read before the Chicago Surgical Society, January 2, 1925.

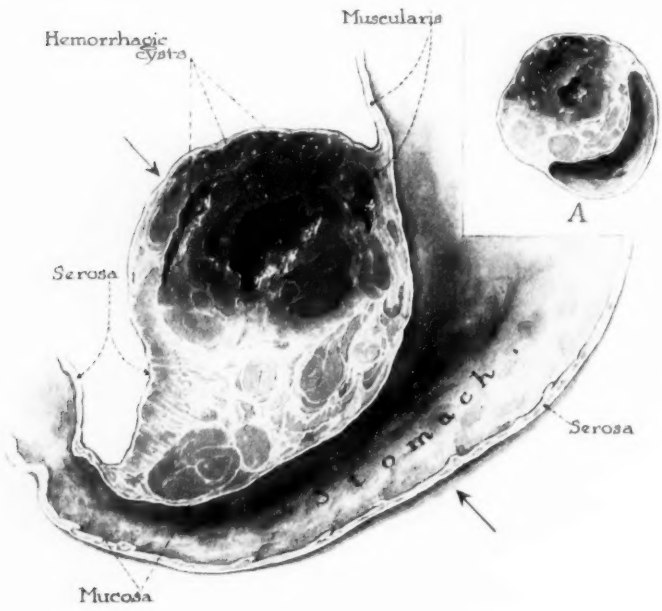

Fig. 1. Reproduction (actual size) of myofibroma of stomach. The stomach is cut longitudinally along the lesser curvature showing the tumor arising from muscular layer and consisting of muscle and fibrous tissue. The wider end of the tumor is darker because of a hyaline change and contains several hæmorrhagic cysts. The mucosa and serosa are intact. The insert, A, is a cross section in the direction of the arrows in the larger drawing and shows that the tumor grows more outward than into the lumen of the stomach. The lumen is encroached upon by the tumor pressing the upper and posterior surfaces of the stomach inward.

Examination revealed a fairly well nourished male patient with a pulse rate of 68, respirations 18, and normal temperature. The pupils reacted to light and accommodation, and there were no abnormal findings in the head, neck, or chest. There was slight tenderness in the right lower quadrant of the abdomen but no mass or enlarged organs were found. There was nothing abnormal in the extremities or genitalia. The Wassermann reaction of the blood was negative. Nothing abnormal was found in the urine. An Ewald test meal, removed in 1 hour, showed an absence of free hydrochloric acid on two occasions and a total acidity of 53. A motor meal showed definite evidence of retention after 12 hours. No blood was found in the stomach contents or stools. X-ray examination showed that the greater curvature of the stomach was on a level with the iliac crests, but the organ was not tender on palpation. The pars pylorica was narrow and the walls apparently rigid, especially along the lesser curvature, so that carcinomatous infiltration of the stomach was strongly suggested. A diagnosis of carcinoma of the stomach was made on the basis of the findings on the X-ray examination, the absence of free hydrochloric acid in the stomach contents, and the age of the patient. Symptomatic and dietetic treatment were instituted with some relief but it was apparent that a cure could result only by operative interference.

The patient was accordingly transferred to the surgical service and was operated upon on August 15. A high mid-line incision was made and after the peritoneum was opened, a large mass about the size of an adult fist was seen to occupy the epigastric region. The mass extended toward the under surface of the liver but was not attached to it nor were there evidences of metastasis. A cyst of the pancreas was at first suspected, but it was soon evident that the tumor arose from the pyloric portion of the lesser curvature of the stomach. The distal half of the stomach with the attached tumor was resected, the duodenum closed and the stump of the stomach was sutured to a loop of jejunum according to the Pólya method. The abdomen was then closed without drainage. The patient made an uneventful recovery and was discharged from the hospital 15

days after operation completely relieved of symptoms. The patient, 4 months later, stated that he had gained many pounds in weight and thought himself cured.

The pathological report is as follows: The resected specimen consisted of the distal half of the stomach in its entire circumference. A pear-shaped tumor mass 7.5 by 4 by 5 centimeters was attached by its side to the lesser curvature and superior portion of the posterior surface of the stomach. The apical end of the mass pointed toward the pyloric orifice, and the entire mass projected outward from the stomach rather than into its lumen. The mass was everywhere covered by peritoneum, was of firm consistency and grayish white in color except at its base where the tissue became brownish red. There were no adhesions or attachments to other organs and the mass was distinctly circumscribed and sharply defined from the remaining uninvolved portion of the stomach wall.

We opened the resected portion of the stomach through the tumor mass and along a line parallel to the lesser curvature, and found a fasciculated, meaty mass which looked not unlike a brownish marble. The tumor grew outward from the stomach wall and was completely covered on the inside of the stomach by intact mucosa and on the outside by unbroken serosa. The tumor mass evidently arose from the muscle layer of the stomach wall, leaving the mucosa, submucosa, and peritoneum uninvolved. The wider half of the tumor was dark reddish brown in color, even more firm than the lighter colored narrower portion, and contained several large-sized hæmorrhagic cysts, evidently the result of degeneration of this portion of the tumor.

Microscopic section from the darker portion showed muscle tissue which had undergone advanced hyaline change. Blood pigment might be seen deposited in various places and many of the blood vessels showed evidences of hyaline degeneration. A section taken from the lighter colored portion, including the mucosa, showed that the mucous membrane, including the muscularis mucosæ and the submucosa were of normal thickness and were not affected by ulceration, inflammation, or other pathological change. The tumor arose from the muscularis and extended outward. The mass consisted chiefly of typical muscle cells with normal nuclei and protoplasm and with little interstitial tissue. Bundles of interlacing strands of connective tissue were seen to form some of the tumor in this region but the cells of this connective tissue were normal in appearance and showed only an occasional mitotic nucleus. There was no involvement or penetration of the layers other than the muscularis by tumor tissue and no distinct evidence of malignancy.

From the appearance of the tumor on gross and microscopic examination, we believe the specimen to be an extragastric myofibroma arising from the muscular layer of the stomach wall, showing advanced hyaline degeneration in many large areas and marked hæmorrhagic cystic formation at the wide end of the mass.

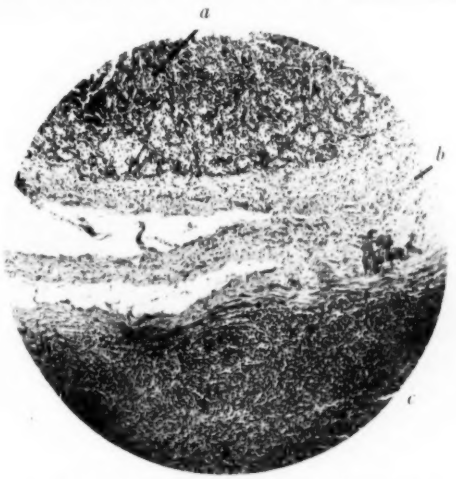

Fig. 2. Microscopic section of myofibroma of the stomach including the musoca. The normal mucosa and muscularis mucosæ rest upon the myofibromatous tissue of the tumor which has invaded the submucosa but not the mucous membrane. *a*, Mucosa; *b*, muscularis mucosæ; *c*, tumor tissue.

GASTRIC POLYPS

Polyps of the stomach have seldom been recognized clinically unless a part of the tumor tissue has been recovered from the stools, vomitus, or lavage water. The advent of the X-ray in diagnosis of diseases of the stomach has made the recognition of this condition much easier, so that there are now reports of cases of polyps of the stomach recognized clinically and corroborated by subsequent operation. Such cases are recorded by J. P. McCullough (12), J. S. Myer (15), and Stoner (23), and show that a more careful consideration of the clinical manifestations and X-ray findings will probably result in a more frequent recognition of polyps of the stomach. As in myoma of the stomach, the importance of recognizing the presence of gastric polyps lies in the prevention of malignant degeneration which occurs in about 60 per cent of instances and in the avoidance of possible complications, the chief of which is continuous and profuse hæmorrhage which may result fatally. Another curious and very alarming complication is intermittent pyloric or duodenal obstruction as reported by J. W. Shuman and D. Cruikshank (22), and R. Matas (11). The importance of these possible

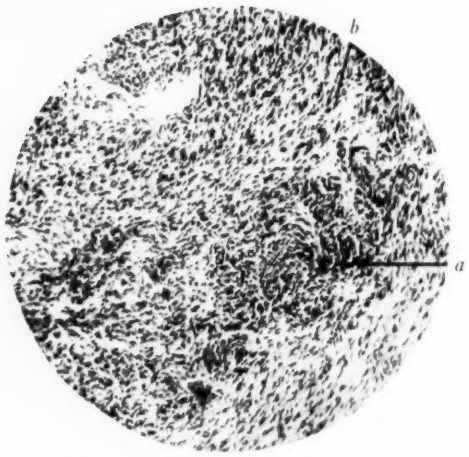

Fig. 3. Microscopic section through lighter colored portion of myofibroma showing *a*, muscle fibres; *b*, fibrous tissue.

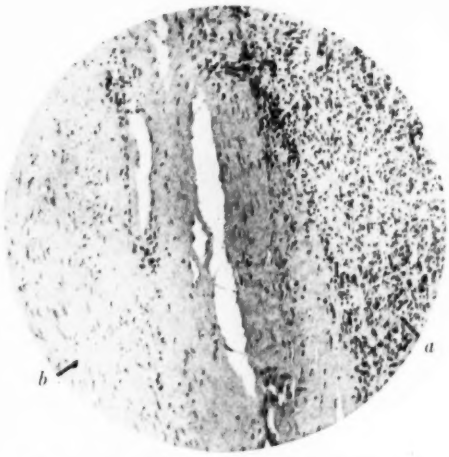

Fig. 4. Microscopic section through darker portion of myofibroma of stomach showing, *a*, muscle tissue; and *b*, muscle tissue which has undergone marked hyaline change.

complications and the comparative paucity in the number of reports of gastric polyps, there being but 122 reported cases in the literature according to Rosenbach and Disqué (20), in 1923, prompts us to report two additional cases in one of which there was also a chronic peptic ulcer and a small carcinomatous tumor in addition to the polyps.

Case 1. J. R., a male, age 50 years, a laborer, entered the medical service of the Cook County Hospital on August 12, 1919, with a complaint of abdominal pain, nausea, vomiting, belching, and loss of weight. Digestive disturbances had been present for about 15 years, but were considerably worse for the last year. The abdominal pain was sharp and cutting, was located in the region of the umbilicus and did not radiate. While a gnawing pain was constantly present, it was aggravated in from one-half to 1 hour after meals and was relieved by vomiting. There was a loss of about 30 pounds in weight in the past year of his illness, and the patient felt that he was getting much weaker. Belching occurred before and after meals. His bowels were regular. There was nothing of significance in the family or past history except a copious hæmatemesis 25 years ago. He was an excessive user of tobacco and whiskey.

Examination revealed a fairly well nourished white male with a pulse rate of 68, respirations 20, and normal temperature. There was nothing abnormal in the head, neck, or chest and examination of the abdomen revealed some tenderness over the umbilicus but no mass could be palpated. The liver was palpable at the costal margin. The extremities revealed nothing abnormal; the reflexes were normal. The Wassermann of the blood was negative. The urine was normal. The stomach contents, removed 1 hour after an Ewald test meal showed absence of free hydrochloric acid and a total acidity of 7 on three different occasions. X-ray examination showed a definite and constant filling defect at the greater curvature of the stomach in the pyloric region. There was no definite degree of obstruction but the appearance was that of a malignancy.

A diagnosis of carcinoma of the stomach was made, perhaps following a gastric ulcer, and the patient was transferred to the surgical service. Operation was performed on August 28, 1919. An incision was made through the left rectus muscle and the stomach exposed. No tumor could be palpated from the outside, but on opening the stomach an extensive papillomatous growth could be seen to involve the entire pyloric portion of the stomach. The distal half of the stomach was resected and the stump sutured to the jejunum according to the method of Pólya. The patient rapidly improved and was discharged on October 19, 1919, almost completely free from symptoms.

The pathological description is as follows: The specimen consisted of the pyloric portion of the stomach. The serosa was smooth everywhere and without evidence of inflammation or adhesions. On opening the specimen, the mucosa was seen to be studded with numerous soft cauliflower-like projections of variable size, resembling large and small warts, some of which were attached by a narrow pedicle and some by a broad base. The mucosa over these projections was wrinkled but intact and showed no evidences of ulceration. A section cut through one of the larger polypoid growths, also

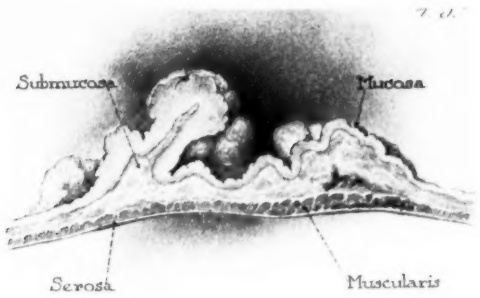

Fig. 5. Multiple polyps of stomach showing that the tumor formation is composed of a stalk of submucosa covered by mucosa. The muscularis and serosa are uninvolved. A polyp with a narrow pedicle is seen at the left and one with a broad base at the right.

traversing the underlying wall of the stomach, showed that the peritoneum and muscular layers were uninvolved. At the site of one of the polpys the submucosa was seen to send up a long thin finger-like process toward the lumen of the stomach. This projection of submucosa was covered on all sides by normal muscularis mucosæ and mucosa so that the two layers covered the projection of submucosa like a glove on a finger. Microscopic examination showed the polyp to consist of a stalk of submucosa with its loose connective tissue and blood vessels and the entire structure to be covered by a layer of normal mucous membrane. The layers were everywhere intact, the cells typically mature, and there was no evidence of malignant degeneration either from the epithelial or connective tissue elements. The anatomical diagnosis in this case was benign polyp of the pyloric portion of the stomach.

Case 2. D. S., a male, age 53 years, and a laborer, was admitted to the medical service of the Cook County Hospital on October 24, 1924, with a history of having been ill for 2 years with abdominal pain, vomiting, anorexia, loss of weight, and constipation. His symptoms occurred in periodic attacks lasting 2 weeks to 1 month; one having occurred 2 years ago, another 5 months ago, and the last attack 2 weeks ago. The abdominal pains were severe, cramplike, extended across the upper abdomen, especially under the left costal arch and caused him to double up. They occurred about 3 hours after meals and were relieved by vomiting and alkalies. Vomiting occurred after solid or liquid food and the vomitus consisted of food and at times of brownish fluid. He had lost 15 pounds in the last 2 weeks, and the constipation was quite severe. The patient did not speak English very well, and no further history could be obtained.

Physical examination revealed a fairly well nourished, middle aged male with normal pulse, respiration, and temperature. Nothing abnormal was found in the chest except moderate emphysema.

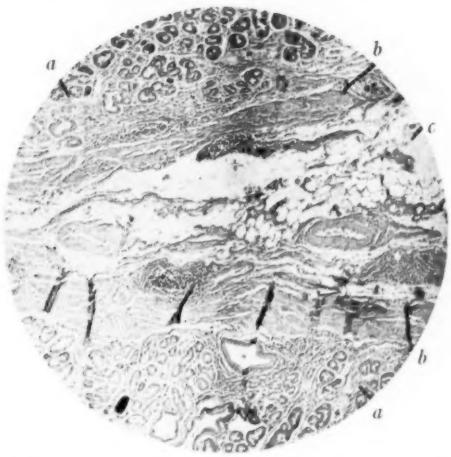

Fig. 6. Microscopic section through a polyp of the stomach showing the stalk of submucosa, *c*; covered on either side by normal muscularis mucosæ, *b*; and by the glandular layer of the mucous membrane, *a*. The section is of the pedicle of the polyp.

Slight tenderness was present along the entire left side of the abdomen and was especially marked in the upper portion. The reflexes and blood pressure were normal. The urine showed nothing abnormal. A Wassermann of the blood was negative. Occult blood was found several times in the stools. The stomach contents after an Ewald test meal on several occasions showed an average free hydrochloric acid of 15 and total acidity of 45. The X-ray showed nothing abnormal in the chest except a slightly widened aorta. The duodenal bulb filled out well, but a considerable residue was left in the stomach after 6 hours. A filling defect was seen at the lesser curvature near the pylorus. A diagnosis of pyloric obstruction probably due to carcinoma was made. Operation was performed on December 15, 1924. A mid-line incision was made in upper abdomen. The pyloric half of stomach was resected and the operation completed according to the method of Pólya.

The resected specimen consisted of the pyloric portion of the stomach including about 1 centimeter of duodenum. The serosa was everywhere smooth and transparent except at a point along the lesser curvature where it was thickened by plaques of white fibrous tissue. There was a nodule 1 centimeter in diameter, slightly raised above the surface of the mucosa, located on the greater curvature about 3 centimeters from the pylorus and was cartilaginous in consistency. The nodule was yellowish white in color and on cut section showed a firm granular surface which was separated from the surrounding tissue by an irregular line of demarcation. At a distance of 3.5 centimeters from this nodule, and on the lesser curvature, a typical chronic peptic

ulcer of the mucosa could be found, oval in outline, 2 by 1 centimeter, with the long axis parallel to the lesser curvature. Numerous small polyp-like growths of variable size were found near the ulcer, the nearest one being 5 centimeters away. None of these polyps was ulcerated. No signs of malignancy were seen at the ulcer. A microscopic section through the nodule previously described showed that the mucosa appeared normal at both ends but that the central portion consisted of typical glandular carcinoma. The carcinoma cells infiltrated the submucosa and the muscularis mucosæ but did not involve the muscular coat itself. Microscopic examination of the polyps revealed the typical structure described in Case 1, but there were several areas which closely resembled malignant degeneration.

ADENOMA EN NAPPE

Adenoma *en nappe* or plaque-like adenoma of the stomach is one of the rarest forms of benign tumor of this organ. It consists of a diffuse adenomatous thickening, usually at the pyloric portion of the stomach and involves only the mucous membrane. To Menetrier (13) belongs the credit of best describing this condition and his masterly description in 1888 still stands as the most complete work on the subject. There are probably not more than three or four reports of this condition in the literature, and as it is almost impossible to differentiate it clinically from carcinoma of the stomach, we mention a case, reported elsewhere, which was operated upon several years ago with apparently a complete cure (1).

Case 1. The patient, a married woman, aged 38, entered the hospital complaining of chronic diarrhœa, marked loss of weight, weakness, anorexia, vomiting of small quantities of food and mucus, and vague dyspeptic symptoms, all of which were present for 5 years. Examination showed a very emaciated, middle aged female who was in poor general condition. Stomach contents, after an Ewald test meal showed a complete absence of free hydrochloric acid and a trace of combined acid. Lactic acid was present. Numerous tests for occult blood in the stools were made, but the results were constantly negative. X-ray examination showed a large filling defect of the pyloric portion of the stomach involving chiefly the greater curvature. The same phenomena were present on several examinations, and a tentative diagnosis of extensive carcinoma of the stomach was made. The long duration of the illness and the apparent slow course of the disease, together with the presence of diarrhœa, led us to suspect that our diagnosis could have been incorrect and operation was advised. Exploratory laparotomy revealed no tumor on inspection of the anterior and posterior surfaces of the stomach. The stomach was then opened but inspection of the inner surface revealed no carcinoma. The wall of the stomach was very thick, the mucosa was quite thickened and congested and the inner layer of the stomach was thrown into large folds so that it resembled prominent cerebral convolutions. This condition was especially marked in the region of the pylorus, especially at the greater curvature. The pyloric half of the stomach was resected up to the duodenum and a gastro-enterostomy performed. Histological examination of the resected portion showed the typical histological picture of adenoma *en nappe*. The patient was seen 5 months later and stated that all symptoms had disappeared and that she had gained much in weight. Another communication from her 3 years later stated that she was in perfect health.

HYPERTROPHIC PYLORIC STENOSIS IN AN ADULT

Idiopathic hypertrophy and spasm of the pylorus in adults is a rare condition, there being but 7 other cases reported in the literature (G. Brunner, 4; J. Schnitzler, 21; J. Mickulicz, 14; Lebert, 10; and C. Nauwerck, 17). The case we wish to report is of importance chiefly because it is impossible to differentiate it from carcinoma and because the patient died although operation could probably have saved his life. A detailed report of this case may be found elsewhere (2).

Case 1. The patient, a white male, aged 46, was admitted to the Cook County Hospital on December 11, 1922, with a provisional diagnosis of carcinoma of the stomach. He had been ill for 8 months with abdominal pain, marked loss of weight and strength and had been vomiting for the last 2 months. The pain was in the epigastrium, came on almost immediately after eating and was relieved at first by the vomiting. The vomitus consisted of mucus, food, and dark brown material resembling coffee grounds. He had lost about 75 pounds in the last 8 months. Examination revealed a very emaciated person and examination of the abdomen showed that a large, hard, tender mass could be palpated in the left upper quadrant. Except for a four plus Wassermann of the blood and an absence of free hydrochloric acid in the stomach contents, nothing else of importance was found. X-ray examination revealed a large 6-hour residue and a constriction of the prepyloric region of the stomach. He died 5 days after admission. Autopsy showed a stomach which was markedly dilated. The pyloric opening was narrow, the mucosa was red and quite smooth resembling atrophic gastritis. A large, saddle back, shallow ulcer was found on the lesser curvature near the pylorus and its largest diameters were 7 by 4.5 centimeters. The shallow depth of the ulcer made it appear more like an erosion. Examination of the

pyloric portion of the stomach revealed a very marked thickening of the wall in this region and microscopic examination showed that the thickening was due chiefly to a hypertrophy of the muscle layer in this region. There was no evidence of malignancy or chronic inflammation. No changes were found such as were described by us in a previous communication which would lead us to suspect a luetic process (W. A. Brams and Karl A. Meyer, 3). A diagnosis was made of idiopathic pyloric hypertrophy with resulting stenosis and secondary erosion of the mucous membrane.

INFLAMMATORY CONDITIONS OF STOMACH AND VICINITY PRODUCING TUMOR FORMATION, RESEMBLING CARCINOMA OF STOMACH

In a previous communication (3) we reported 2 cases of anatomically proved syphilis of the stomach which produced a clinical picture very closely resembling carcinoma. We mention this condition in our series because of the rarity of anatomically proved gastric syphilis, there being but 14 other cases reported in the literature, and because the recognition of well developed cases should not offer insurmountable difficulties in diagnosis. As was pointed out in our previous report, the diagnosis rested chiefly on a history of chronic digestive disturbances, anacidity of the stomach contents, a filling defect on X-ray examination, marked emaciation and a history or evidence of previous luetic infection or response to specific treatment after ordinary measures failed. An absolute diagnosis can be made only on histological examination of the involved portion of the stomach, a detailed description of which may be found in our previous communication. The chief point of importance lies in the fact that the thickened pyloric portion of the stomach may produce a palpable mass which, together with a marked emaciation and absence of free hydrochloric acid may produce a clinical picture difficult to differentiate from carcinoma until a detailed histological study had been made.

Finally, we wish to call attention to the not uncommon involvement of the pancreas in association with chronic peptic ulcer. As a result of inflammatory and proliferative changes in the pancreas, this organ may become enlarged either in part or entirely and may produce a mass in the epigastrium which can easily be mistaken for carcinoma. Failure to recognize the cause of this tumor formation during operation can mislead the surgeon so that the causative peptic ulcer of the stomach is overlooked or the necessary operative procedure not undertaken because inoperable malignancy is suspected.

RÉSUMÉ

1. A series of non-carcinomatous tumors of the stomach is reported consisting of 1 myofibroma, 2 polyps, 1 adenoma *en nappe*, 1 hypertrophic pyloric stenosis in an adult, and mention is made of certain inflammatory conditions, namely, syphilis of the stomach and inflammatory pancreatitis associated with chronic peptic ulcer.

2. The importance in recognizing these conditions consists of the fact that operation, except in syphilis of the stomach, is the only procedure which can cure the patient. Even syphilis of the stomach may require surgical aid if the symptoms of obstruction are severe or if marked connective tissue scar stenosis has developed.

3. The non-malignant tumors of the stomach, especially the myomata and polyps, may undergo malignant degeneration in a large proportion of the cases and early radical removal is the only logical method to prevent this complication.

4. Polyps and myomata may cause severe or fatal hæmorrhage or occlusion of the pylorus or duodenum with alarming symptoms.

5. Recognition of these tumors and prompt surgical treatment may not only cure the conditions, but may also prevent the occurrence of the serious complications sometimes caused by benign growths of the stomach.

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24. Weber, E. Zentralbl. f. Chir., 1, 1558.

CONGENITAL SALIVARY FISTULA OF THE NECK

By RICHARD R. SMITH, M.D., F.A.C.S., and WILLIAM R. TORGERSON, M.D., Grand Rapids, Michigan
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THE abundant literature of the past 20 years, as recorded in the *Index Medicus*, fails to reveal a case similar to the one we are reporting.

The patient was a young woman, 18 years of age, who sought advice in regard to a persistent fistula in the mid-line of the neck just beneath the chin. Members of her family stated that this had been present since birth. She said that there was an intermittent discharge of a clear, watery fluid, and that its flow was markedly increased when she ate food. Even the thought of food produced the same result. Diligent inquiry established the fact that there had never been any swelling at the site of the fistula, nor any redness or pain suggesting an inflammatory process. There was nothing else of note in her history.

Upon examination the patient was found to be a well developed, well nourished young woman, who presented the following peculiar condition. Beneath the chin in the mid-line of the neck was a very small fistulous opening which discharged at intervals of a minute or two, a few drops of a clear, watery, slightly viscid fluid that suggested saliva. The fistulous opening was flush with the skin. Nothing could be made out in the neck or in the floor of the mouth. The normal salivary ducts were apparently discharging as usual. A probe could not be introduced into the fistula at this time because of lack of co-operation on the part of the patient. In view of the location, the intermittent character of the discharge, and its relation to eating and the thought of food, a tentative diagnosis of salivary fistula was made.

Operation. The fistula was first injected with methylene blue, a Luer syringe and a small needle which entered the opening easily being used. A fine wire was then passed directly inward toward the base of the tongue for about 4 or 5 centimeters before it met an obstruction. A transverse incision encircling the opening was made and a duct-like structure containing the fistula was slowly dissected from its bed. There was no sign of any inflammatory reaction about the tract and it was separated from the surrounding tissue with comparative ease. It extended directly backward toward the base of the tongue, becoming bulbous in its deeper portions. As it passed under the mandible, a distinct groove in which the duct lay was found on the under surface of this bone. The whole tract was removed. The inner end lay close to the floor of the mouth under the tongue. The specimen was found to be made up of a narrow duct-like portion and a larger bulbous portion, the whole being about 4 centimeters in length. Hardening in formaldehyde reduced its size to about 2 centimeters. The wound healed in the usual time. There has been no recurrence to date, some 6 months after the operation.

The pathological report by William McK. German, director of the Blodgett Memorial Hospital laboratory, Grand Rapids, is as follows: "The structure removed from beneath the chin is a tube about 2 centimeters in length, and is lined its entire length by squamous epithelium, beneath which is connective tissue, striated muscle, fat, and small islands of cartilage. At the upper end of this tube numerous clusters of salivary mucous glands empty into it by small ducts lined by cuboidal epithelium. As the skin surface is approached there are numerous sebaceous glands and occasional hair follicles. The mucous glands become less numerous as the skin surface is approached. Diagnosis: This is a congenital anomaly, possibly of teratoid origin.

The outstanding features of the case are:

1. The presence of the duct since birth with the absence of infection or swelling. Thyroglossal ducts are usually closed at birth and later swell and rupture. The result is a fistulous tract that soon becomes infected.[1]

2. The absence of ciliated columnar epithelium lining the duct. Thyroglossal ducts are usually lined with such unless this has been destroyed by an inflammatory process, of which there was no evidence here.[1]

3. The history of increased flow of its secretion when eating or thinking of food. This suggested the presence of salivary tissue.

[1] Gilman, P. K. Cysts and fistulæ of the thyroglossal duct. Surg., Gynec. & Obst., 1921, xxxii, 141.

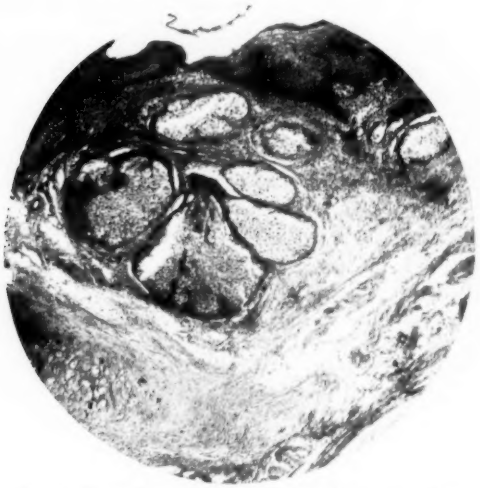

Fig. 1. Photomicrograph of section taken at distal end showing lumen, squamous epithelial lining, clusters of sebaceous glands, and an island of cartilage.

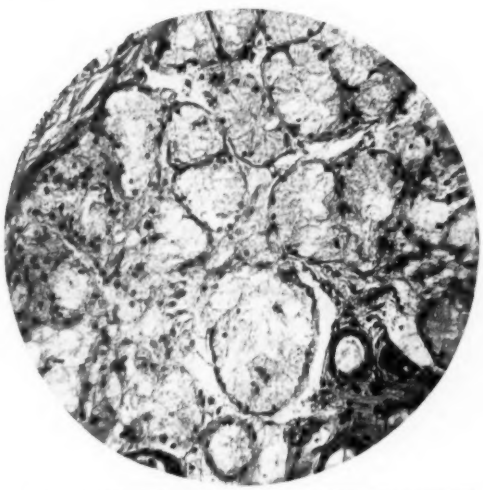

Fig. 2. Photomicrograph of section taken near proximal end, showing typical salivary mucous glands.

4. The finding microscopically of salivary gland tissue. This means that we were dealing with either an aberrant salivary gland with its duct opening on the skin surface or a teratoid structure which included salivary tissue.

5. The groove in the mandible. This indicated that the duct must have been present during early fetal life.

6. The presence of cartilage in an unusual location. This would tend to substantiate the teratoid nature of the whole structure.

DISCUSSION

Were we dealing here with a teratoid structure containing salivary tissue which, having an outlet, continued to function, or was it an aberrant salivary gland? Its location in the region where salivary gland tissue is normally found would point to the latter, as would also the fact that food stimulated its secretion. But more significant is the presence of cartilage not normally found in this region which we think puts the structure in the teratoid group.

Teratoids do produce functioning gland tissue depending, it is believed, upon the stage in the development of the embryo at which the anlage of the structure was separated. In a very early undifferentiated stage it is very doubtful as to whether functioning tissue would be produced. But later, when cells become better differentiated and possess a potentiality for the production of a certain gland, as salivary gland in this case, there would hardly be any question as to their power of producing a functioning gland. We know there are frequently found aberrant salivary glands with ducts opening into the floor of the mouth, and these function. Also we know that teratoids contain functioning glands. A dermoid contains functioning skin glands, the secretion being sebaceous. We find also teratomata with thyroid tissue containing colloid.

The possibility that this might be a thyroglossal duct seems to us to be definitely disproved. The history is not the usual one of a thyroglossal duct. The location of the duct above the hyoid bone and entirely unconnected with it, would seem to be another very definite point against this possibility. The idea that we were dealing with salivary tissue opening into a thyroglossal duct could not be substantiated. Thyroglossal ducts are usually lined with a ciliated columnar epithelium instead of a squamous epithelium. The evidence rather indicates that we are dealing with a teratoid structure containing salivary tissue. This tissue continued to function because of an anomalous duct formation.

SYPHILIS IN RELATION TO PREGNANCY[1]

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THE present age, as it affects the practice of medicine, may truly be said to be an age of prevention, in so far as its primary aim is to forestall, anticipate, and prevent the occurrence and spread of disease in any form. Hence it is inevitable, on account of its great prevalence, its ravaging ramifications, and above all, its most protean character, that so much attention should be focused upon syphilis. Of all lesions none is more widely met with, and none demands more thorough study and investigation than this loathsome disease, especially when it occurs in conjunction with pregnancy. That this should be so, is evidenced by the ever prevalent incidence of heredosyphilis, with its resultant economic burden upon the state, and its biological waste of human life.

At the outset, therefore, too much emphasis cannot be placed upon the necessity for an actively intensive and concerted co-operation between the obstetrician, the syphilologist, the pediatrician, and the social hygienist, in providing thorough study and care for each pregnant patient who presents herself to us during a most important epoch in her life, for her own welfare, and that of her unborn child.

In any preventive campaign, the fundamental fact to be ascertained is who is diseased and how many are diseased. It follows, therefore, that one of the fairest methods of ascertaining the incidence of syphilis in pregnancy, is by the performance of a routine Wassermann test upon all pregnant women, from every walk of life. The necessity of this measure is at once apparent to anyone who has attempted to obtain a history of lues from a pregnant woman. Jeans, for instance, states that in his series, 87 per cent of mothers denied all knowledge of the infection. Beck, in his studies, reports that he was able to obtain an aid to diagnosis only by history and physical examination in 18.72 per cent of cases. While I am ready to admit that a carefully obtained history, bearing particularly upon previous abortions, miscarriages, or premature labors, or the birth of macerated fetuses, as well as a history of any symptoms suggestive of lues, is of paramount importance, nevertheless, in the light of our own experience, together with that reported by others, we feel fully convinced that the routine Wassermann test constitutes at the present time a most valuable diagnostic procedure.

On account of the greater difficulty in diagnosing lues in women as compared to men, in respect to the detection and recognition of the initial lesions, it follows that the disease in women is more often overlooked, with its resultant ill-effects upon the mother, as well as her unborn child. The reason for this is apparent when one remembers that in a considerable number of cases, the primary lesions in women are about the cervix or in the upper part of the vagina, in which regions, they are for obvious reasons, unrecognized, or are often confused with other pathological entities. In our series of cases, which we are willing to admit constitutes too small a number from which to deduce absolute conclusions, the value of the performance of a routine Wassermann upon every obstetrical patient has been very markedly impressed upon us.

In only 2 patients in the series of over 400, could we obtain a definite history suggestive clinically of syphilis. One of these was an illegitimately pregnant primipara, who admitted previous but inadequate treatment, and who showed the existence of a tertiary syphiloderm. The other was a multipara who stated that her husband had received a few intravenous administrations of salvarsan. The other 10 patients who had a strongly positive serologic reaction, gave absolutely no history suggestive of a luetic infection, and showed no clinical evidence of any of the usual signs of syphilis.

The incidence of syphilis in pregnancy according to the figures reported from various clinics, and based upon the findings from a routine Wassermann test, varies from about 3 to 4 per cent. Among others, Hinton of

[1] Paper read by invitation before the Ottawa Medico-Chirurgical Society, December 5, 1924 and the annual meeting of the Ontario Medical Association at Toronto, May 7, 1925.

Boston found a positive reaction in 4.18 per cent in a series of 10,427 pregnant women, while Williams of Baltimore reports 2.48 per cent positive reactions in white women in a collective series of 4,347 cases. Our own series gave a positive reaction of 2.90 per cent in 413 cases.

We now come to a consideration of the significance of a positive Wassermann reaction occurring in a pregnant woman, and here we must digress for a few moments to discuss the validity of the dictum known as Colles' law. In 1837, Abraham Colles, the Dublin surgeon, announced the possibility of a mother giving birth to a living or dead syphilitic child without herself showing any evidence of the disease, and that she would remain immune to infection from her own child, while others might be infected by it.

This hypothesis, of course, presupposed infection of the ovum by means of the spermatozoon, and the subsequent development of immunity by the mother. In other words, it supports the paternal theory of infection. For many years, Colles' law was universally accepted, and among others, Fournier was an ardent believer in its validity. However, it remained for Matzenauer in 1903, to challenge and, in fact, deny the applicability of the formula. Following the discovery of the spirochæta pallida in 1903, and of the Wassermann reaction in 1907, the correctness of Colles' law has been subjected to intensive investigation, with the result that most writers absolutely deny its possibility upon both clinical and other grounds. In other words, the maternal theory of infection, in which the mother is infected primarily, and the fetus secondarily, is favored by most investigators.

This skepticism in regard to the paternal theory of infection, is in great measure justified when we recall that the relatively large size of the spirochæta as compared with that of the spermatozoon, would make it highly improbable for the parasite to be carried into the ovum by the male element. Another objection which has been advanced but which has not as yet been proved, is that the spirochæta cannot survive on egg albumin alone, but needs differentiated cells which are not present in the ovum.

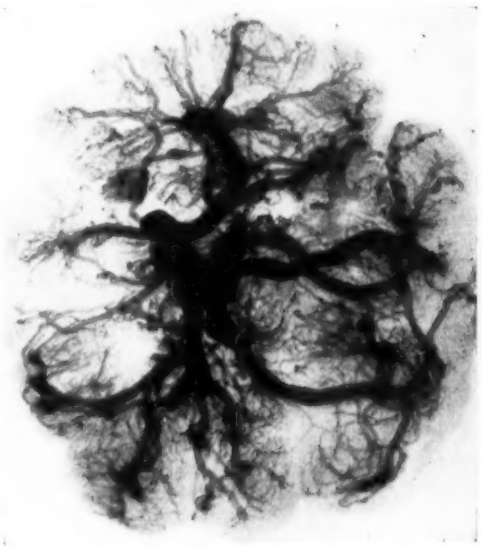

Fig. 1. Normal placenta. Combined injection of the vascular tree in a normal placenta at term. The individual cotyledons with their blood supply are readily discernible.

Hence the possibility of the paternal theory of infection is questioned by some and denied by many. The plausibility of these objections is further enhanced by the findings of a positive Wassermann reaction in pregnant and puerperal women who are supposed to substantiate the law of Colles. For some unexplained reason, it is argued that the disease exists in a latent form, without giving rise to the usual signs and symptoms. Consequently, the reason why the mother does not become infected by the child is that she is already suffering from the disease.

Notwithstanding the objections raised, so eminent an authority as Williams cites two extremely interesting cases, which together with his extensive experience and exhaustive investigations upon the subject under discussion, force him to the conclusion that the possibility of Colles' law has not yet been proved or disproved, and the dictum, therefore, must be regarded as still *sub judice*. Similarly, the law of Profeta which states that syphilitic parents may give birth to a non-syphilitic child, or that the child develops an immunity *in utero*, has also been disproved by long con-

tinued observations upon such infants, and by the Wassermann reaction.

With this discussion of the laws of Colles and Profeta, we may now ask ourselves two questions. What significance should be attached to the occurrence of a positive Wassermann reaction in pregnancy? Does it inevitably mean that the mother is suffering from syphilis and that she will transmit the disease to her child? While the Baltimore school is not prepared to answer the first question conclusively, and while among others, Menten has shown that a positive reaction before parturition will often become negative shortly after delivery, I am inclined to agree with Browne of Edinburgh, who as a result of a recent intensive investigation states that the presence of a strongly positive Wassermann reaction may be said to constitute very decisive evidence of the presence of syphilis in the pregnant woman. Although in total disagreement with Moore, Browne also concludes from his study that there is no evidence whatever that the reaction is modified by pregnancy, for he states that he has never known of a case in which a Wassermann positive before pregnancy, became negative during pregnancy apart from treatment. Nor has he ever known of a case in which a Wassermann negative during pregnancy, became positive after delivery. In reference to the second question, however, the present state of our knowledge permits us to state definitely that the finding of a positive Wassermann on the mother during pregnancy does not necessarily mean that the child will develop syphilis, for it is conservative to assume in the light of recent studies, that less than one-half of the women with positive reactions will give birth to syphilitic children.

As to the significance of the Wassermann reaction on the cord blood at the time of birth, the concensus of opinion seems to be that a positive reaction does not necessarily mean that it will remain so, and conversely, that a negative Wassermann at birth does not necessarily preclude the possibility of it becoming positive later.

Fordyce and Rosen support Williams, Kilduffe, and other investigators in their conclusion that the results of cord Wassermanns are not to be unreservedly relied upon when taken alone, and should not be made the sole basis for a diagnosis of syphilis in the newborn. Hence the study first made by Fildes in 1915, is confirmed by others, who in addition offer the opinion that the information obtained by the Wassermann made from the fetal blood at birth is not commensurate with the time and money expended in such studies. Compared to this, however, the routine microscopic study of the placenta for the detection of so-called Frankel's disease, especially in suspected cases, is of greater significance and affords more conclusive evidence as to the presence or absence of syphilis, than does serological investigation.

PLACENTAL SYPHILIS

This leads us to a short consideration of placental syphilis or the pathology of the syphilitic placenta, first accurately described by Frankel in 1873. The histopathological changes which syphilis produces in the placenta, are so characteristic as to be almost pathognomonic of the disease. Grossly, the placenta is increased in size and weight for the duration of pregnancy, so that instead of weighing $\frac{1}{8}$ to $\frac{1}{6}$ the weight of the child the ratio in syphilis may be increased to $\frac{1}{4}$ or more. The organ is pale, fatty, œdematous, of a yellowish greasy appearance, and more friable than usual. Extensive infarction is a common finding. If a fresh specimen be teased in water or normal saline solution, one can observe marked changes in the chorionic villi, which show a decrease in the usual dichotomous arrangement; they are thickened and of irregular size and the ends of many villi exhibit a distinct clubbing and a marked decrease in their vascularity.

These characteristic histopathological changes are, of course, due to an obliterative endarteritis and endophlebitis, in turn the result of the syphilitic infection. In section, one can observe an increased density in the stroma cells, which have lost their stellate appearance, and are more closely packed together and resemble connective tissue cells. The caliber of the vessels is greatly decreased, and not infrequently there may be an entire disappearance of them, so that only very small

Fig. 2. Combined injection of the vascular tree in a placenta from a patient at term, whose blood Wassermann was very strongly positive when first seen in the early months of pregnancy. The patient was treated intensively and gave birth to a living apparently healthy child. Note the absence of any abnormal changes in the vascular tree, and the absence of any infarctions, even the end arteries being plainly visible.

vessels may be seen in the large villi. Hence infarction, which is so commonly seen, by diminishing the blood supply often accounts for the poor development and frequent death of the fetus with its premature expulsion. The demonstration of spirochætæ in the placenta, although quite difficult at times, may be accomplished by proper technique after the method of Levaditi.

INFLUENCE OF SYPHILIS UPON PREGNANCY

Quite often the patient exhibits an aggravation of the ordinary subjective discomforts of pregnancy, and complains of intense headaches, persistent neuralgias, insomnia, alopecia, secondary anæmia, loss of weight, and at times a persistent fever of a moderately severe degree. On account of the vascularity of the tissues during pregnancy, the primary lesions are sometimes more persistent than in non-pregnant women, and the lesions of the genital mucous membranes appear to be greatly stimulated. Condylomata increase in size, and the lymph nodes may become markedly swollen.

INFLUENCE OF SYPHILIS UPON LABOR

While labor may be quite normal in many cases, nevertheless abnormal deviations are not infrequently encountered. On account of the frequent prematurity or maceration of the fetus, abnormal presentations are comparatively common. According to Gellhorn, weak contractions due to primary uterine inertia is not an infrequent complication. An unfavorable condition which one may have to con-

tend with is that due to an abnormal resistance of the cervical tissues, which on account of œdema and marked induration as well as an increased proliferation of the connective tissue and a sclerosis in the surrounding vessels, may give a wooden consistency to the cervix, so that the impression conveyed to the examining finger is that of a hard ring pessary. Premature rupture of the membranes may add to further delay in cervical dilatation. In those cases presenting signs of maternal or fetal exhaustion, operative interference may become necessary and may include either incisions of the cervix or delivery by forceps.

When tertiary lesions and ulcerations are present, obstacles may present themselves at the outlet, with resultant deep perineal lacerations. Gellhorn states that a perineal tear occasioned by the presence of syphilitic lesions, should not be repaired but should be allowed to heal by granulation, aided by intensive antiluetic treatment, following which secondary perineorrhaphy may be attempted. Rarer complications such as postpartum hæmorrhage, spontaneous rupture of the uterus, premature separation of the placenta, etc., have been recorded by various authors.

INFLUENCE OF SYPHILIS UPON THE PUERPERIUM

The two most important complications which one may have to deal with are infection, on account of the lowered resistance of the syphilitic individual, and subinvolution, due to imperfect contraction of the diseased uterine musculature. Hence, when in the absence of the usual causes of subinvolution, the condition does not yield to the usual lines of treatment, syphilis should be borne in mind as a possible etiological factor. Pyrexia during the puerperium is not necessarily caused by syphilis.

INFLUENCE OF PREGNANCY ON SYPHILIS

In 1920 Brown and Pearce carried out an experimental study on the reaction of pregnant and lactating females to inoculation with treponema pallidum, in which they showed that a pregnant rabbit inoculated with the spirochæta at the time of conception fails to react to infection in a manner similar to non-pregnant controls. (In his clinical studies on the course of syphilitic infection in pregnant women, Moore has shown that in the human, as in the animal, definite alterations in the course of lues are caused by pregnancy.)

The most important of these consists either in a complete suppression of the usual early lesions of the disease, provided infection and impregnation approximately coincide; or if infection occurs during the course of, or in late pregnancy, the patient may develop the usual manifestations of syphilis, which are, however, much milder than if she is infected independently of pregnancy. This protection against the early lesions of syphilis afforded by pregnancy, according to Moore, may persist over many years, and possibly for a lifetime.)

In his series of 200 cases, those women who developed late syphilis were especially prone to involvement of the viscera, and cardiovascular systems, while tertiary lesions of skin or bones, and particularly neurosyphilis, either clinical or asymptomatic, were rare. He also points out that almost half of the women who are clinically neurosyphilitic, have not been pregnant since infection. The exact nature of the mechanism by which pregnancy causes these alterations in the course of a syphilitic infection, is at present unknown, but several possibilities have been advanced.

It has been suggested that, on account of the chemical alterations in the blood and tissues of pregnant women, of which the outstanding feature is a marked increase of cholesterol in the former, pregnancy affords a protection against, as well as an alteration in, the course of a syphilitic infection. Routh, on the other hand, has advanced a theory which has not yet been proved but which presupposes that chorionic ferments are cast off into the maternal circulation and that this factor suppresses the syphilitic lesions. Finally, as a last resort a betrothal, as it were, between syphilis and the poor endocrine system, which bears so much insult these days as a cause for all ailments, has been suggested, with the result that the glands have been accused of causing these alterations in the pregnant syphilitic. (Moore states that his studies convince him that the majority of women who acquire syphilis simultaneously with the

occurrence of pregnancy, are singularly free from the graver remote complications of the disease.

INFLUENCE OF SYPHILIS ON THE INCIDENCE OF INTERRUPTIONS IN PREGNANCY AND ON THE OCCURRENCE OF FETAL ABNORMALITIES

According to the usual statements found in many textbooks on obstetrics, a history of repeated abortions, miscarriages, and stillbirths, is to be regarded as almost an axiom that syphilis is present and responsible for these interruptions of pregnancy. Recent studies, however, have been carried out which throw a great deal of doubt on such suppositions, and thus a survey of the more recent literature excites a certain amount of skepticism as to whether syphilis is really such an important factor in the causation of abortion and stillbirth as was formerly supposed.

In this regard, therefore, the studies of Adair supported by those of Cruickshank are of great interest, in that they tend to throw a new light upon the subject under consideration. Adair, in an examination of 1,095 women, found that while the incidence of abortion is approximately 1 in every 3 pregnancies, syphilis is not an important factor in its production in the first 3 months of pregnancy, and that it has little influence on the incidence of miscarriage during the second trimester, since the incidence for both syphilitic and non-syphilitic groups is approximately the same, viz., about 30 per cent. However, the most striking fact brought out by Adair's study was that while lues is not responsible for a large proportion of the interruptions of pregnancy in the first 6 months, it is of predominating importance as the commonest single cause of premature births and stillbirths in the last trimester.

This is in close agreement with the results of Cruickshank's investigations on maternal syphilis as a cause of the death of the fetus and of the newborn child. Williams in his studies, has shown that syphilis is responsible for 34.44 per cent of the total number of fetal deaths in a series of 302 cases, and that this is almost equal to the combined mortality from dystocia, toxæmia, and prematurity. In our own series of cases it will be noted that there was a history of abortion in only 2 out of the 12 mothers with strongly positive Wassermann reactions, thus agreeing, even if only in a small way, with the findings of other investigators.

It follows, therefore, that if lues is recognized early in pregnancy, and is treated intensively along appropriate lines, from the standpoint of the child, almost ideal results will be obtained. More will be said about this in speaking of congenital syphilis.

Up to the present time, no evidence has been adduced to show that syphilis is a cause of fetal monstrosities and deformities, although it is perhaps a little more frequent in children of luetic parents than in those of non-syphilitic parentage. My personal experience on this phase of the subject has up to the present failed to convince me that lues is to be regarded as a specific cause for congenital malformations, for in a considerable number of cases showing an anencephalic monster, hydrocephalus, or craniorrhachischisis, I took a Wassermann on the mother, and in every case the test proved negative. Losee reports a similar experience, while Holt, in 56 consecutive cases of congenital abnormalities, failed to get a single positive Wassermann.

IMPORTANCE AND INFLUENCE OF TREATMENT OF MOTHER

The importance of instituting early treatment in pregnancy for the benefit of the mother and to insure the birth of a healthy non-syphilitic child cannot be overestimated. While Fordyce and Rosen warn us that little can be expected if we delay until the last weeks of pregnancy, I agree entirely with Welz and Van Nest, Beck, and others, that full treatment should be attempted even at the end of pregnancy, in the hope of securing a controlled case in a living child, which can be further cared for after birth. I venture this statement, in so far as pregnant women usually tolerate the treatment devoid, in my experience, of any deleterious effects, provided, of course, no associated pathology of the kidneys is present.

The specific qualities of the treatment and the development of antibodies may, as has

been frequently pointed out, proceed through the placenta or through the milk. Creadick reminds us that Ehrlich offered this explanation as applying to those cases in which the infant improved while being nursed by the mother, who was at the same time receiving intravenous medication.

This is further substantiated by the results of a recent experimental study by Underhill and Amatruda, on the transmission of arsenic in the form of neo-arsphenamine from mother to fetus. These investigators have shown that arsenic can be detected in small traces in the fetal tissues after the mother has received an intravenous administration of the drug. They state, however, that while the amount of arsenic recovered from the fetal tissues does not increase in proportion to the number of serial injections given, the amount of arsenic which is stored in the maternal liver and placenta, does increase with the number of injections. The explanation which they offer, which appears reasonable in the light of their experimental investigations and from common clinical observations for the efficiency of antenatal treatment of syphilis, especially on the newborn, is that the drug acts in greater concentration and more directly on the spirochætæ in the placenta.

That much can be expected from antiluetic treatment of the mother, is shown by the highly satisfactory results obtained by Williams. In his series, when no treatment was instituted, 48.5 per cent of the children manifested signs of syphilis, as contrasted with 39.2 per cent, and 6.7 per cent when the treatment was inefficient or efficient, respectively. In our series of cases, out of the 12 children born of mothers with positive reactions only one gave a positive Wassermann shortly after birth, and one a suspicious positive reaction, while all 12 children were born alive and showed no evidence clinically of any of the usual stigmata of congenital syphilis. This, therefore, leads us to a short consideration as to what constitutes efficient treatment of the mother.

As soon as a diagnosis of syphilis is made, the mother should receive at least 6 doses of salvarsan or its derivatives, beginning with 0.4 grams, and gradually ascending to 0.6 grams at weekly intervals, together with 1 grain of mercury salicylate once a week for 12 to 15 injections. If the mercurial injections are painful, they should be discontinued and mercury by mouth or mixed treatment should be prescribed. It is needless to remind you that careful and constant attention must be paid to the kidneys and other organs for the possible development of toxic symptoms.

If after these 6 intravenous and 12 intramuscular injections, the Wassermann test remains positive, a repetition of the treatment is necessary until the serological reaction is negative, and remains so for at least 1 year after treatment has been discontinued. If such a plan is adhered to, almost ideal results, especially from the standpoint of the child, will follow. Furthermore, surprising results may sometimes ensue with what would ordinarily be regarded as altogether inefficient treatment in men or in non-pregnant women. Hence, as Williams points out, there must be something about pregnancy which tends to decrease the virulence of the syphilitic infection, and predisposes to a spontaneous cure. This is, as was pointed out in a previous section of the paper, in close agreement with the experimental work of Brown and Pearce.

Before leaving the question of maternal syphilis, it may not be amiss to say a few words on the question of marriage of a patient who has had a syphilitic infection. In this respect, the extensive experience of Fordyce and Rosen is valuable, and is worthy of being followed. These clinicians believe that a person who has had active antisyphilitic treatment, who is free from all clinical evidence, who has a negative spinal fluid, and whose blood has been negative for 2 years, may be permitted to marry.

FETAL SYPHILIS

It has already been pointed out that syphilis is responsible for about 30 per cent of all stillbirths occurring in the last trimester of pregnancy. A study by Royster has shown that antenatal syphilis is not only responsible for a large percentage of stillbirths and deaths of newborn infants, but also exerts a far reaching

influence in childhood, adolescence, and even in early adult life. Out of a total of 1,000 cases treated in a free clinic, 7.04 per cent of white children had inherited syphilis. Jeans studied a group of 389 infants at 2 or more months of age, and by a careful physical examination and a Wassermann test, found a total incidence of syphilis in 5.65 per cent of cases, the percentage of whites being 2.4 per cent, and that of black infants 9.3 per cent. He also emphasizes the fact that in every instance in which the placenta was noted as showing syphilitic changes, the infant was later found to be suffering from syphilis. This again emphasizes the importance of a routine microscopic study of the placenta, especially in suspicious cases. Other writers give the incidence of hereditary syphilis in several large American cities as varying from 2 to 6 per cent.

Although it is usually stated that 80 per cent of macerated fetuses are luetic, the fact that spirochætæ are not found in the viscera of these fetuses does not necessarily exclude syphilis, as the cause for failure to demonstrate the organism is usually due to faulty technique. Similarly on account of the laking of the blood of a macerated fetus, a Wassermann cannot be performed in these cases.

One of the most characteristic lesions of congenital syphilis occurring in the early weeks of life is osteochondritis syphilitica, first described in 1870 by Wegner, who distinguished three stages of the lesion. This may be observed at the junction of the epiphysis and diaphysis of nearly all the long bones, but especially the lower ends of the femora and the upper extremities of the humeri and ribs. Instead of a straight, narrow, whitish line of calcification at the junction of the epiphysis and diaphysis (Guerin's line) as is normally seen, there is a widely irregular and thickened yellowish line which extends into the neighboring cartilaginous layer. The calcification zone is broad, and more friable, while the cartilaginous zone may be either enlarged or diminished. The epiphysis as a whole may become thickened and enlarged. Clinically, the condition is known as pseudoparalysis, on account of the listless and motionless attitude assumed by the infant, the chief symptom being a loss of function of one or more of the extremities.

Physical examination of the newborn syphilitic may disclose an apparently healthy infant, showing no signs of lues during the first 6 weeks of life. On the other hand, the child may be underdeveloped for the duration of pregnancy, and on account of a marked lack of subcutaneous fat it may appear as the typical old man, small and wizened, puny, weakly, and sickly. The skin is usually coarse, dry, flabby, wrinkled, and of a brownish or muddy-yellow color. The skin on the flexor surfaces, particularly of the elbows, knees, and groins, is very apt to crack and expose the corium, which is of a reddish purple color, if the child is macerated.

The limbs and face may be œdematous. On the palms of the hands and soles of the feet, macules and bullæ are very frequently seen. Fissures of the lips and anus are common observations, while mucous patches in the mouth and nose as well as around the anus and vulva, and mucosal hæmorrhages, especially of the nose are not infrequently seen.

The most common changes involving the viscera are enlargements of the liver and spleen, in both of which there is a marked increase in fibrous connective tissue, and a small round cell infiltration. The abdomen may be enlarged, either as a result of visceral enlargement or due to the existence of ascites. The lungs are heavier than normal, and show histological changes similar to those found in the liver.

If the child shows no signs of the disease at birth, it usually discloses them in about 80 per cent of cases, if untreated, within 8 weeks, when the so-called late congenital syphilis manifests itself by snuffles, pemphigus, cutaneous eruptions, paronychia, restlessness, sleeplessness, generalized lymphadenopathy, etc. In respect to congenital syphilis our diagnostic facilities have been greatly enhanced within the past 2 years by Shipley and his coworkers, who in studying the skeletons of 300 white fetuses from the sixth month of pregnancy to term by means of the X-ray demonstrated typical luetic lesions of a pronounced nature in 25 per cent of cases, and

well marked or suspicious lesions in 46 per cent.

They have demonstrated these syphilitic lesions in all the bones, but they state that there is apparently no interference with skeletal growth. Briefly, these syphilitic changes are confined to the epiphyseodiaphyseal regions, and in the fetal type of reaction the periosteal lesions are secondary in importance to the endochondral defect. There is an intensification of the shadow cast by the bone at the epiphyseal line, which becomes broader and more homogeneous and seems to form a cap on the ends of the trabeculæ of the spongiosa, which change is significant of an abnormally heavy calcification of the provisional calcified zone, as compared to the very narrow zone in normal cases. The epiphyseal border of the shadow cast by the bone has a notched, saw-toothed or serrated appearance. The trabeculæ of the syphilitic bone appear to be finer than in the normal bone.

In some cases it is worth remembering that the only clue to the diagnosis may be a progressive and unaccountable loss of weight, often as much as many ounces in a day, which marasmic condition ceases as if by magic with the institution of antisyphilitic treatment which we shall now briefly describe.

On account of their pre-eminence in the field of syphilology, I can do no better than describe the treatment recently adopted by Fordyce and Rosen. Discarding the old fashioned method of inunction, they now give from 6 to 8 intramuscular weekly injections of neutral neo-arsphenamine to the course, and make the initial dose 0.1 grams for infants from 2 to 12 weeks old, and gradually increase it to 0.3 grams for children 3 years old. In addition, they give twelve intramuscular injections of mercuric chloride at intervals of a week in doses ranging from $^1/_{10}$ of a grain for infants from 2 weeks to 6 months, to $^1/_4$ of a grain for those more than 3 years old. They follow each course of which they advise 2 full ones, with a rest period of from 4 to 6 weeks, regardless of a negative reaction, and in some cases administer a third course of mercury.

They report eminently satisfactory results with no untoward effects from this plan of treatment. In cases in which the infant is very much underweight with a poor musculature, mercury alone is given at weekly or biweekly intervals until there is an improvement in the general condition, following which neoarsphenamine may be administered.

A question which frequently presents itself to us is what should be done with infants with negative Wassermann reaction born of parents with a positive Wassermann. As Fordyce and Rosen state, at times it is very difficult to give a decisive answer to this question. As these authorities point out, one often sees the statement made that children of luetic parents should be treated irrespective of whether symptoms are present or not, and regardless of the negative Wassermann reaction of the parents. The conservative opinion offered by Fordyce and Rosen that this is an unnecessary hardship seems to be fully warranted, and one therefore is inclined to agree with them that it is preferable to keep such children under surveillance for several years after we have satisfied ourselves, in the absence of clinical manifestations, that the blood and spinal fluid are negative.

The child of a syphilitic mother or father should never be nursed by a non-syphilitic woman, for although it may show no signs of the disease, there is always the possibility of it being infected, and thus it will infect a healthy wet-nurse. Neither should a syphilitic woman or the mother of an infected child act as a wet-nurse, for her milk contains spirochætæ and will infect a healthy child.

From our discussion it will be seen that we as physicians have a most important duty to fulfill to humanity. As guardians of the health of our fellow beings, and as a profession which must at all times be responsible for the alleviation of human suffering and of the diseases to which mankind is heir, it behooves us to cooperate in a concerted manner, so that we may combat the third great plague of modern civilization, and thus relieve the state of a tremendous economic burden resulting from its ravages, and curtail to a minimum an unnecessary wastage of human life.

SUMMARY AND CONCLUSIONS

1. Syphilis occurred in 2.90 per cent in our series of 413 pregnant women, which percent-

age is in agreement with the incidence of 3 to 4 per cent reported by other investigators.

2. The performance of a routine Wassermann test in pregnancy constitutes a most valuable diagnostic procedure.

3. Colles' law has neither been conclusively proved nor disproved, and must therefore be regarded as still *sub judice*, although the maternal theory of infection is favored by most investigators, and appears to be the more likely method by which the fetus is infected.

4. The occurrence of a positive Wassermann reaction in pregnancy constitutes very decisive evidence of the existence of syphilis in the mother.

5. The finding of a positive Wassermann on the mother during pregnancy does not necessarily mean that the child will develop syphilis.

6. The results of a Wassermann reaction on the cord blood are not to be unreservedly relied upon when taken alone, and should not be made the sole basis for a diagnosis of syphilis in the newborn.

7. Routine microscopic study of the placenta for evidences of Frankel's disease affords more conclusive evidence as to the presence or absence of syphilis than does serological investigation.

8. Syphilis may influence pregnancy, labor, and the puerperium in many ways, with great discomfort to the mother and with deleterious effects upon the child.

9. Through some unexplained mechanism, pregnancy may cause definite alterations in the usual course of a syphilitic infection.

10. Syphilis is not an important factor in the production of abortions in the first trimester of pregnancy, and it has little influence on the incidence of miscarriages during the second trimester.

11. Syphilis is of predominating importance as the commonest single cause of premature births and stillbirths in the last trimester of pregnancy.

12. Syphilis cannot be regarded as a specific cause for congenital malformations or monstrosities.

13. As soon as a diagnosis of maternal syphilis is made, the patient should be intensively treated along appropriate lines irrespective of the duration of pregnancy.

14. Every newborn infant should receive a thorough physical examination very shortly after birth, for the possible detection of any of the stigmata of congenital syphilis.

15. Every infant showing signs of congenital lues should receive antiluetic treatment, and should be kept under surveillance for a long period of time.

16. Extreme caution should be exercised in choosing a wet-nurse for an apparently non-syphilitic infant, and similarly no syphilitic child should be nursed by a non-syphilitic woman, on account of the very great possibility of infecting each other.

17. All departments of medicine should cooperate in an effort to combat the incidence of syphilis in pregnancy with its resultant economic burden upon the state, and its great waste of human life.

TABLE I.—INCIDENCE OF SYPHILIS IN FOUR HUNDRED THIRTEEN PREGNANT WOMEN

Case	Age	Para	Previous Pregnancies	Baby	Remarks
1	25	II	Abortion at 4½ months, Cause unknown	Alive	Wassermann on baby suspicious.
2	18	I		Alive	Wassermann on baby negative.
3	27	III	Lost first baby at full term. Operative delivery	Alive	Wassermann on baby negative.
4	27	III	Previous pregnancies full term with living children	Alive	Wassermann on baby negative.
5	26	II	First pregnancy full term with live child	Alive	Wassermann on baby not taken.
6	21	IV	Previous pregnancies full term with living children	Alive	Wassermann on baby positive; positive Kahn.
7	36	VI	Previous pregnancies full term with living children. No miscarriages	Alive	Wassermann on baby negative. Husband treated inadequately.
8	24	III	Previous pregnancies full term with living children	Alive	Wassermann on baby not taken.
9	23	I		Alive	Mother showed tertiary syphiloderm. Baby's Wassermann negative.
10		I		Alive	Wassermann on baby negative.
11		III		Alive	Mother not treated.
12	20	II	Abortion at 3 months with first pregnancy. Cause unknown	Alive	Wassermann on baby not taken.

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RUPTURE OF THE SPLEEN WITH REPORT OF AN UNUSUAL CASE

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THE case I am about to report is I believe unique because 28 days elapsed from the time of the initial injury until the profound symptoms presented.

On April 15, 1923, Dr. G. V. Crouse of Cleveland was called to see a fifteen-year-old girl. About 9:30 p.m. while sitting in a movie, the patient had sudden pain in the lower left abdomen. She vomited before she was able to get into the aisle, and was immediately assisted to the street, where she fell and vomited again. She was taken to her home. About midnight I was called in consultation.

The patient was in shock: the pupils were dilated, the skin cold and clammy, respirations 28, pulse 140 per minute and compressible. The musculature of the abdomen was rigid. The patient was conscious but in severe pain, which had spread over the entire abdomen, and radiating pain had extended into the left shoulder region. Little history could be exacted at this time, inasmuch as the patient appeared to be *in extremis* and her family knew nothing except that she had not felt well for about 1 month. Rectal examination was negative. White blood count was 14,000 and red blood count 3,200,000. The patient was moved to the hospital, where hot packs were applied to the abdomen and infusion given. Small doses of morphine were given. On palpation of the abdomen the greatest pain was in the lower left quadrant, but due to rigidity, examination was unsatisfactory. Anteriorly there was tympany and dullness in the flanks.

Inasmuch as the patient rapidly rallied with the infusion and hot packs, operation was delayed. Eight hours after the onset the patient's general condition had improved: the pulse dropped to 100 and the abdomen had lost some of its rigidity but the pain still persisted and had shifted more to the midline with rather marked tenderness in the right iliac fossa. A definite diagnosis could not be made; therefore we decided upon an exploratory laparotomy.

Early April 15, 8 hours after the onset, under nitrous oxide plus oxygen anæsthesia, laparotomy was performed. A high mid-line incision was made. The peritoneum was black. The peritoneum was incised and large quantities of blood and clots poured out of the wound. Tubes and ovaries presented no abnormality. The appendix was found to be inflamed and thickened and was removed. Upon exploration of the upper abdomen a sudden gush of blood with large clots came from the left side. The incision was enlarged upward and outward to the left along the border of the ribs. The spleen was readily located, found to be large and œdematous, with a rent on its outer surface, which was partially filled with clot and from which blood was flowing rapidly. Splenectomy was performed, and the wound closed in layers. Even before the abdominal wound was closed, transfusion was started and the patient received 1400 cubic centimeters of blood.

Within 6 hours after operation the patient's general condition was good, temperature was 100.6, pulse 110, respirations 23. From this time on improvement continued, although upon several occasions during convalescence the temperature ranged to 102. Since the home conditions were such

HÆMATOLOGY OF AN UNUSUAL CASE OF RUPTURE OF THE SPLEEN

1923	Hæmoglobin	Red blood count	White blood count	Differential white blood count	
					Per cent
Apr. 15 10:30 p.m.	70	3,200,000	14,000		
Apr. 16 8:00 a.m.	70	2,900,000	17,200		
Apr. 16 7:00 p.m.	65	3,900,000	19,000		
Apr. 17	80	4,800,000	25,900		
Apr. 20		4,200,000	16,000		
Apr. 24		4,020,000	15,000		
Apr. 28		4,100,000	14,000		
May 5		3,690,000	11,200		
May 9		4,000,000	10,000		
May 18		3,400,000		Polynuclear	44
				Large lymphocytes	4
				Small lymphocytes	42
				Eosinophiles	3
				Transitional	7
				Basophiles	0
June 4	80	4,050,000	17,000	Polynuclear	48
				Large lymphocytes	3
				Small lymphocytes	40
				Eosinophiles	2
				Transitional	7
				Basophiles	0
Aug. 10	90	4,300,000	9,800	Polynuclear	58
				Large lymphocytes	4
				Small lymphocytes	34
				Eosinophiles	3
				Transitional	1
				Basophiles	0
Dec. 23				Polynuclear	62
				Large lymphocytes	4
				Small lymphocytes	26
				Eosinophiles	4
				Transitional	4
				Basophiles	0
Apr. 14 1924				Polynuclear	65
				Large lymphocytes	2
				Small lymphocytes	28
				Eosinophiles	3
				Transitional	1
				Basophiles	1

that she could not have proper care there after the wound had healed, the patient was kept in the hospital 49 days and discharged in excellent condition. At no time during the patient's convalescence were there present any pains in the long bones such as are frequently described. As soon as practicable after operation a complete history was elicited from the patient.

It seems that 4 weeks to the day before the sudden onset of pain, while playing at school, the girl was thrown against a desk, striking on her left side. The pain in the left subcostal region was severe, but after lying down for a short time, she was able to go home. There was still some tenderness in the left subcostal region and so she remained quiet for a few days, but gave no reasons to her family except that she did not feel well although she went to school daily and assisted with the house work.

From the pathological examination of the removed spleen, there is no question but that at the time of the original injury she suffered a rupture of the spleen; first, the rupture may have consisted of a short split in the capsule which filled with blood clot and thus the wound was tamponed until for some unknown reason a second hæmorrhage occurred; secondly, the rupture was subcapsular and it took a month of slow bleeding before the capsule was ruptured at the site of the original contusion.

The opening on the surface of the spleen measured about 4 centimeters in length, while below the capsule the splenic tissue was split so that it was almost in two pieces and held together by the intact capsule. The halves of the spleen were separated, and a cavity, almost round and about 5 centimeters in diameter, was directly below the split in the capsule and into this cavity, it was found, a branch of the splenic artery opened.

That many cases of rupture of the spleen have not been reported is evidenced by the fact that literature on that subject is exceedingly incomplete. In a review of the literature up to 1920 I was able to find only 218 cases of subcutaneous rupture of the spleen reported. The mortality was about 28 per cent. The treatment, as in every other acute condition depends upon the symptoms presented, but lies between two methods, splenectomy or suture. The tampon can have no place except as an emergency measure.

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DEGENERATION OF FIBROMYOMATA OF THE UTERUS[1]

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FIBROMYOMATA of the uterus are probably no more subject to gross degenerative changes than are most other benign tumors, which fact is noteworthy when one considers the enormous size attained by some of these tumors, the large blood supply necessary for their nourishment, the various degrees of pressure, motility and trauma to which they are subjected, and the changes which occur in the host itself during menstruation, pregnancy, and senility. On the other hand, the types of degeneration and the different pictures presented are extremely varied. Because of this multiplicity of degenerative processes and of the names applied to them, and because of their more or less indefinite relationship, a group of fibromyomata showing degenerative changes and the histories of the patients were studied to determine the clinical significance of the degeneration.

During the year 1923, 404 patients were operated on at the Mayo Clinic for uterine fibromyomata. Gross degenerative changes were noted in 53 specimens, an incidence of 13 per cent. In all, 200 specimens were available for study. As a matter of fact, if microscopic sections from all fibromyomata were examined diligently, evidence of slight degeneration would be found in a large number. Such change, however, is of little significance, either pathologically or clinically. This series includes only gross degenerations uncomplicated by either carcinoma or sarcoma. So-called sarcomatous degeneration is in the true sense not a degenerative process but the exact antithesis. The tumors designated as "cellular" or "secondary hyperplasia," however, are probably more often degenerative than regenerative.

Gambier asserts that each fibromyoma nucleus receives only one artery, that it may divide before reaching the fibromyoma on its surface, or after penetrating its interior. Bardon studied the vascularization of fibromyomata by the injection of material opaque to the X-ray, and concluded that they had a double circulation: peripheral and central. The first is very abundant and is connected with the uterine circulation by points of anastomosis. The second occurs in the form of a terminal artery, any obstruction of which causes central necrosis. Sampson, who carefully observed the effect of injections into arteries and veins, did not verify the presence of this double circulation. He says: "In many instances only one nutrient artery was found, in others two or three, with one predominating. Often the only communication found between the intrinsic arteries of the tumor and the myometrium was by the nutrient arteries. In some of the medium-sized and large tumors an anastomosis was found between the arterioles of the myometrium about the tumor and similar vessels in the periphery of the myoma." The single arterial supply of most fibromyomata explains why nearly all degenerative processes are diffuse, affecting all parts of the fibromyoma in the same manner, but the central portion more markedly, as it is not nourished by the anastomotic branches around the periphery.

HYALINE DEGENERATION

Hyaline is almost always associated with every type of degeneration in fibromyomata. Apparently it is the result of the first reaction of the tumors to an insufficient blood supply. Grossly it gives a yellow or brownish tinge to the usually white tumor, and when marked, increases its consistency, although it is often soft and succulent. Microscopically, the degeneration is seen either as a more or less diffuse hyalinization of the extracellular framework, giving the characteristic homogeneous pink appearance when stained with hæmatoxylin or eosin; or as sharply circumscribed, bright red areas in which at first the structure appears identical with that of the surrounding tissue (Fig. 1). Later the nuclei disintegrate, leaving nuclear débris.

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These areas are scattered throughout the tumor and form the site of predilection for the deposition of calcium salts. Twenty-four specimens of this group were classified as containing gross hyaline degeneration alone, but even some of these were associated with œdematous or cystic changes. Although hyalinization occurs in most cystic tumors, it is not necessarily a primary stage in their formation; in fact, the circumscribed complete hyaline areas are more resistant to cystic solution than the remainder of the tumor.

ŒDEMATOUS AND CYSTIC DEGENERATION

The degeneration in most of the specimens was œdematous, myxomatous, or cystic. Eighty such, extremely variegated specimens were studied, and since they were a part of the same pathological process, they were considered as one group. In 48 of them there were actual cysts, containing either a watery fluid or a gelatinous material. In 4 of the submucous type, in which half or more of the tumor projects into the uterine cavity, there was uncomplicated cystic degeneration. These tumors varied from a small soft intramural fibromyoma to a huge one, filling the entire abdomen. The average diameter of these tumors, not including the extremely large ones, was more than 9 centimeters. There were several which filled the entire abdomen; one contained approximately 4 gallons of fluid.

Clinically they usually present no untoward symptoms. Because of their size, urinary disturbance is common. In cases of marked degeneration, the patient usually consults a physician because of recent increasing enlargement of the abdomen, sometimes accompanied by moderate soreness or tenderness. With such a history and the presence of a soft fibromyoma, degeneration should be suspected. If the mass is actually cystic on palpation, the diagnosis is nearly always ovarian cyst because of its far greater incidence.

The first stage of cystic degeneration is characterized by œdema. Grossly this can be recognized by the decreased consistency, the crumbling, and the semifluctuant or watery appearance of the tumor. The transudation of fluid into the tissues accounts for the increase in the size of the tumor, observed clinically. The cells become more spherical, larger, and more vesicular; they occupy more space and in places appear to be closely packed, giving rise frequently to the diagnosis of "cellular" or of "secondary hyperplasia." There are no mitotic figures, however; as Evans has pointed out, the frequency of mitotic figures forms the only safe histological criterion on which to base a diagnosis of malignancy or "near" malignancy. On the other hand, it is often impossible to determine whether one is dealing with a rapidly growing fibromyoma, or with one about to degenerate. In more œdematous precystic areas, the cells become widely separated by non-staining fluid, and may acquire a stellate appearance (Fig. 1).

Besides the increase in tissue fluids, the cells themselves undergo destruction by karyolysis. The extracellular tissue, which stains faint pink, and is finely fibrillar, increases proportionately and becomes more homogeneous, just as in diffuse hyalinization. The nuclei then fade out, leaving a completely homogeneous mass, grossly appearing to be an irregular cyst full of a watery fluid which, on exposure to air usually becomes gelatinous or myxomatous. It is the solution of the fibromyoma itself which produces the gelatinous areas and gives rise to the name "myxomatous" (Fig. 2). Its chemical nature is not known, but it is not true myxomatous tissue. A fine fibrillar network may appear at the very edge; this quickly disappears, leaving an amorphous, lightly eosin-stained center. When stained with Sudan III, numerous small, salmon pink, fat globules are seen scattered around the periphery. As these areas increase in size, the contents completely liquefy. Throughout such a tumor, especially around and within the gelatinous areas, are seen small round cells and larger mononuclears, which seem to be phagocytic, often containing débris and pigment in their cytoplasm, and are probably responsible for the removal of the degenerated residuum. Increase or decrease in vascularity cannot be detected with the microscope. The cyst formation is gen-

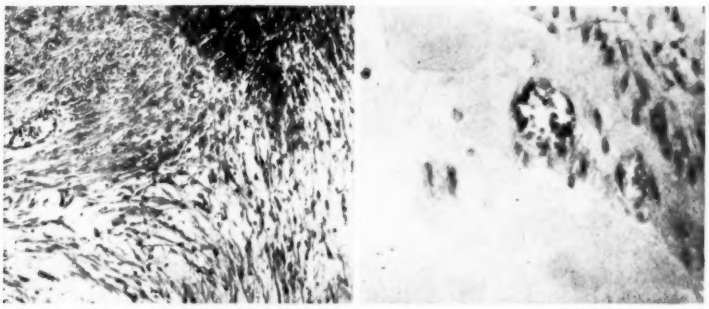

Fig. 1 (left). Œdematous and hyaline degeneration. Separation of cells by œdema. The circumscribed dark area is an area of hyalinization. It takes a bright red stain with hæmatoxylin and eosin. (x 60)

Fig. 2. Myxomatous degeneration. Karyolysis of the nuclei. Replacement by a homogeneous mass. Several large mononuclear cells are visible. (x 200)

eralized, but more evident in the center of intramural fibromyomata, and in the central distal part of pedunculated ones. The discrete necrobiosis of only a portion of a tumor, with resulting cyst formation, is indeed very uncommon.

The picture of cystic degeneration is often complicated by hyaline degeneration, thrombosis, hæmorrhage, or calcification. Thrombosis and hæmorrhage are frequent variations. A generalized myxomatous tumor may contain numerous reddish speckled areas due to visible vessels, or it may be streaked by extravasated blood, either into the tissue or into the gelatinous material, showing a beautiful multicolored surface on cut section (Fig. 3). The cyst may contain bloody fluid or blood clots adherent to the walls. Microscopic examination reveals that all the discoloration is due to extravasated red blood cells and blood pigment, due in turn to the ever present thrombosis.

RED DEGENERATION AND TOTAL NECROSIS

Red degeneration of fibromyomata is so-called from the red color imparted during necrobiosis. Although it is a gross diagnosis, this type forms a separate, fairly well-defined group, distinguishable to a certain extent, both clinically and histologically. It is frequently associated with pregnancy. Bland-Sutton reports 40 cases, 26 of which were associated with pregnancy, and says "the change is more frequent, more intensive and more extensive when associated with pregnancy." The Mayo Clinic group included 33 specimens, 23 of which gave evidence of a rather recent necrobiosis (typical red degeneration); 10 were associated with symptoms referable to the degeneration, and 5 only were associated with pregnancy. These statistics, however, are of little value because relatively few pregnant women come to the Mayo Clinic, and because the frequently emergent nature of the accident prevents traveling any great distance. Of the 10 patients presenting symptoms of degeneration, only 2 had had recent severe pain.

The symptoms vary from a dull ache or soreness, with weakness, fatigue, and lassitude, to a sudden attack of acute pain with a tender mass and a mild fever and leucocytosis. The symptoms depend on the acuteness of the necrosis and on the size of the tumor: the two factors which determine the amount of autolytic toxic material thrown into the blood stream.

Grossly the specimens may present patchy red streaks (Fig. 4), a red central portion or a diffuse red, reddish-brown, or brown discoloration (Fig. 5). Schiller reports a case in which the necrosis and discoloration were entirely peripheral, but usually the whole fibromyoma is involved (Fig. 6). The most necrotic ones give off an odor as of decaying animal matter. Their consistency is soft and possibly crumbling, and necrotic, but absolutely homogeneous, with no evidence of actual cyst formation. The dry nature of the

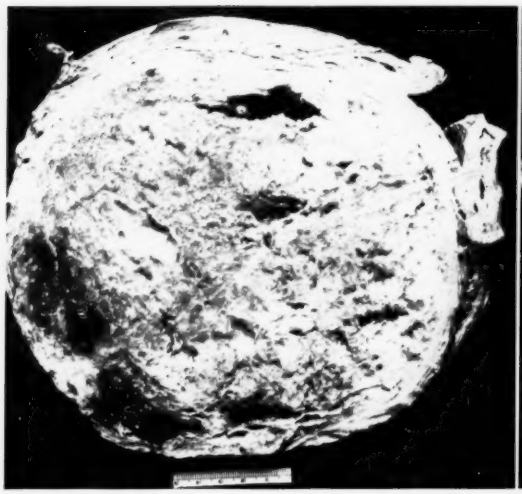

Fig. 3 (left). Cystic and myxomatous degeneration with hæmorrhage.

Fig. 4. Red degeneration. Patchy discoloration in a fibroma of the ovary; torsion 2 weeks previously.

tumors, on section, is more or less characteristic. It is conceivable that a tumor like that in Figure 6 would ultimately form a cystic mass full of chocolate colored material, but this one, after fixation in formalin, formed a surprisingly solid, firm, homogeneous mass. This solidity of structure is more evident in the fixed specimens without cyst formation. On the other hand, red degeneration can be definitely traced through the stages of brown, gray, and yellow degeneration, and ultimately to calcification. The red may persist even to the stage of calcification and give rise to the diagnosis "red degeneration and calcification." Usually it becomes a lighter, dirty gray or yellow, often with yellow or bright orange streaks around the periphery. Later calcium salts are deposited around the whole circumference. Murray likewise has noticed this transition.

Microscopically, red degeneration is characterized by patchy, or sometimes complete, fatty necrosis with thrombosis of the vessels, extravasation of red blood cells and deposition of blood pigment. Several investigators have cultured this type of fibromyoma for organisms. The consensus of opinion has been that the necrosis is not a septic process; if infection does occur it is secondary and of grave import. In none of these specimens was there microscopic evidence of infection. Marked vascularity was a striking feature; numerous blood sinuses sometimes formed an almost angiomatous mass; most of the sections showed thrombosis and in all there were extravasated red blood cells and blood pigment. Sudan III stain revealed a remarkable amount of lipoids which sometimes form red crystalline deposits. Round cells, large mononuclear cells and even a few polymorphic leucocytes infiltrated the tissues to a moderate degree. The picture was what would be expected if the venous return had been obstructed, but on the other hand, torsion of pedunculated tumors presents a different histological picture. Figure 6 represents a pedunculated fibromyoma with typical red degeneration produced by torsion of the pedicle. Among 71 specimens of fibroma of the ovary 2 were found with red degeneration due to torsion. One with a patchy red discoloration had caused a severe attack of pain 3 weeks before; and torsion of the pedicle had been diagnosed. In a second case the history suggested attacks of torsion over a period of 3 years, the last attack 2 weeks before. At operation the pedicle was found to be twisted 2½ times. It had a general red to blue color

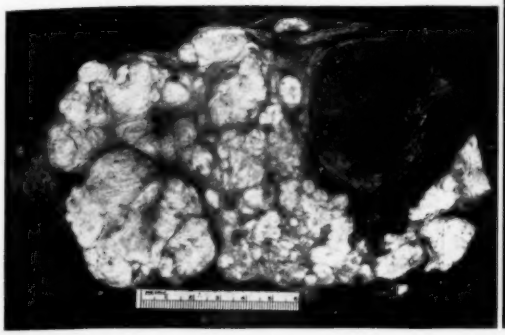

Fig. 5. Huge multinodular subserous fibromyoma, one section of which is undergoing red degeneration without symptoms.

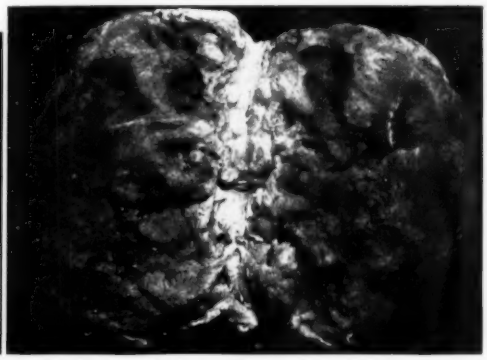

Fig. 6. Typical red degeneration in a pedunculated tumor, 12 centimeters in diameter, with torsion of the pedicle.

and histologically proved to be similar to red degeneration of uterine fibromyomata.

Sampson (9), by injecting the arteries of a fibromyoma, has shown that the arterial supply is very abundant, even more so than that of the uterus itself, while by similar injection into the veins he was able to demonstrate only a very scant venous supply. This insufficient venous drainage with an overabundant arterial supply would predispose to incomplete or complete venous stasis during the congestion consequent on pregnancy, venous obstruction, thrombosis by torsion, pressure, or uterine contraction. If the main artery alone were blocked, one would expect to find necrosis due to anæmia, with possibly some discoloration around the periphery. There is apparently a profound stasis in the circulation and histologically it appears to have arisen chiefly by a sudden blocking of the venous, rather than the arterial blood. Murray has emphasized the hæmolytic action of the lipoids, and believes that thrombosis is secondary to this action, that it occurs within the vessels and is followed by extravasation of the pigment. It is more probable, however, that hæmolysis occurs in the usually abundant infiltrating red blood cells.

Smith and Shaw, in a series of cases, correlated the symptoms with thrombosis, because they observed that thrombosis was more marked when there were many symptoms, and usually absent when there were no symptoms. Increased thrombosis may indicate merely a more acute process. In a group of 5 specimens in which enormously dilated sinuses filled with thrombi dotted the whole surface, there was very little discoloration, no diffuse discoloration, and very little necrosis. None of the patients had had symptoms. The thrombi were in every stage of formation, indicating a relatively slow progression, which may account for the very slight necrosis.

In discolored fibromyomata in which necrosis is more complete, the cut surface will show a brown tinge and later a gray or dirty yellow. In the latter, microscopy reveals almost complete necrobiosis, and an amorphous mass with still visible blood sinuses, old disintegrating red blood corpuscles, and a much lesser amount of hæmosiderin. Sudan III stain demonstrates large amounts of fat. At this stage, chiefly in the periphery, yellow or bright orange streaks are common, in some imparting a bright yellow to the whole cortex, as in 10 cases of this series. With hæmatoxylin and eosin stain, the color is always due to a deposit of bright yellow pigment in amorphous or crystalline form (Fig. 7). In the earlier stages hæmosiderin appears in similar amorphous clumps. Variations from these black amorphous to brown amorphous to yellow crystalline deposits can be observed. They stain neither for fat nor iron, and are presumably composed of hæmatoidin. When it is present, there is usually either gross or microscopic evidence of calcification.

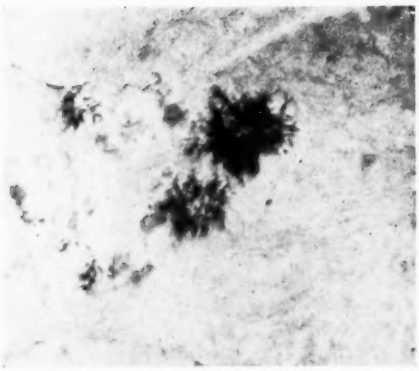

Fig. 7. Hæmatoidin pigment in a totally necrotic tumor. The old blood sinuses containing disintegrated red blood corpuscles are still visible.

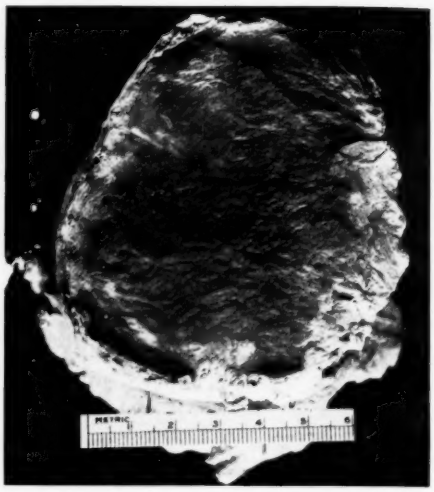

Fig. 8. Calcification following total necrosis. A reddish-brown center with encircling rim of calcium salts.

CALCIFICATION

Calcification occurs in two forms (2). That following red degeneration or total necrosis is characterized by complete necrosis of the tumor, with a tough yellowish center and a deposit of calcium around the periphery. Here the most favorable foundation has been laid for calcification; that is, an irremovable mass of dead tissue with fatty degeneration. Klotz described calcification as a process preceded by the formation of neutral fats, and later of fatty acids, with which the calcium from the blood and lymph forms insoluble soaps. Wells does not agree with this view. He, however, admits some association between fatty degeneration and calcification. It is commonly stated that these fibromyomata die in their own coffins, that the encircling rim of calcium shuts off the circulation and causes death, but all of the evidence indicates that the fibromyoma is completely necrotic long before calcification occurs. Of 39 specimens, 30 were of this type (Fig. 8). It is interesting to note that 2 patients with a single interstitial calcified fibromyoma, which acted merely as a foreign body, chiefly complained of severe menorrhagias, which must have been due purely to the mechanical effect of the dead mass.

The second form of calcification occurs as the deposit of hard, yellow, bony-like material scattered throughout the tumor or confined to separate lobules or degenerated areas (Fig. 9). The resemblance to bone is striking. Heterogeneous bone has often been noted in fibromyomata; in these specimens, however, even after numerous microscopic sections, a positive diagnosis of bone could not be made, but a deposit of calcium on a non-cellular fibrous framework remained after decalcification. The deposition may occur in any part of the necrotic tumor, but it has a distinct predilection for the circumscribed bright red-stained hyaline area. The interstitial tissue remains in fair condition. This type of calcification differs from the former in that the calcified areas look and feel like bone and are either distributed throughout the tumor like cancellous bone or confined to one section, and there is no encircling rim of white, hard layers of calcium. The necrosis is not total.

The average age of the 39 patients was 50 years. The average age of the whole series was 44. One patient only had symptoms due to the degeneration itself. The tumor (Fig. 9) had been present 35 years and had produced numerous attacks of acute abdominal pain. The operation was performed during a very severe attack, and this large stony tumor, with a torsion of its pedicle and a complete axial rotation of the uterus and adnexa, was found.

Fig. 9. Pedunculated tumor weighing 9 pounds, with bony-like calcified areas, which produced an axial rotation of the uterus.

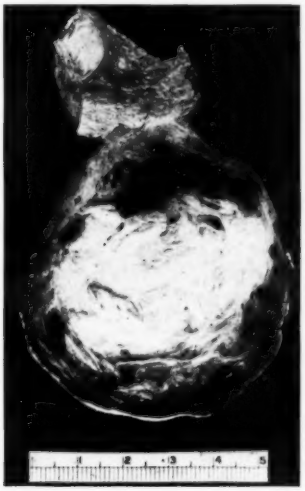

Fig. 10. Cut section showing beginning peripheral infection and necrosis in a submucous pedunculated fibromyoma.

INFECTION OF SUBMUCOUS FIBROMYOMATA

The infected pedunculated submucous fibromyoma gives a distinct pathological picture which obtains in no other type of degenerated tumor. There were 13 specimens in the series studied. Grossly the tumor was a foul-smelling gangrenous mass covered by hæmorrhagic necrotic tissue. On the cut section, it was seen that the central part was fairly solid and white, and large, dilated, thrombosed sinuses passed through it (Fig. 10). The cortex consisted of a layer, 1 or 2 centimeters in thickness, of intensely black hæmorrhagic material. Microscopically, this black rim, beginning at the periphery, consisted of a fibrinous layer, soon infiltrated by large numbers of polymorphic leucocytes, and a great deal of extravasated blood around numerous blood sinuses. There was an organization of thrombi in the sinuses and likewise of extravasated blood, with pigmentation by hæmosiderin almost everywhere. The center of the fibromyoma was œdematous or hyaline. The clinical symptoms of this sort of tumor are likewise characteristic. The patients, usually the climacteric, have had marked menorrhagia, none of them for more than 3 years, and most of them for less than a year. They have had metrorrhagia and the characteristic watery discharge. They are invariably anæmic, in a weakened condition, and frequently require transfusions.

Sampson (10) asserted that the mucosa over a submucous tumor becomes atrophied, with the resultant disappearance of the glands and vessels, and it is not the seat of the bleeding in menorrhagia. A different situation arises, at least when degeneration and infection occur. The whole periphery is a mass of blood sinuses from which bleeding can arise with the greatest ease. The thrombosis of the veins of the central part can easily produce sufficient venous stasis to aid materially in the hæmorrhage. This is not an acute process, as evidenced by the old organized pigmented thrombi. In fact, it is possible that the necrosis has been gradually advancing during the entire period that the patient has had marked symptoms; that is, several months or years. In these cases the myoma presented at the cervical os and all bleeding promptly ceased after vaginal myomectomy.

SUPPURATING FIBROMYOMATA

In all, there were only 3 cases of infection other than that in the pedunculated sub-

mucous type of tumor. One was a subserous cyst, about 15 centimeters in diameter, in a woman of 28 years who was 5 months pregnant. Moderate discomfort and bladder irritation were the only symptoms. The contents of the cyst were semi-purulent, and the walls showed definite evidence of infection. The second case was a tumor in the right broad ligament containing an abscess which opened into the ileus, 5 years after the menopause had passed. The abscess may have arisen by contiguous infection from the ileum, but it is more probable that it opened secondarily into the ileum. The third case was that of a woman of 42 years, who had had moderate pelvic discomfort for 6 months. On opening the abdomen, free fluid was found with evidence of considerable inflammatory reaction. In the very center of the tumor, which was 14 centimeters in diameter, there was a small, red area, similar grossly to that of red degeneration, but microscopically appeared to be a true inflammatory process. Nixon drew attention to the rarity of infection in fibromyomata and reported only 1 case in 1,200 operations for fibromyomata by Deaver. The 3 cases in this series were found in 6,500. The statistics on the early cases are not absolutely accurate, and the actual incidence was probably higher; however, it indicates the relative infrequency of the complication.

FIBROLIPOMATA

Two tumors were encountered which had been diagnosed as degenerative, and which on microscopic examination showed collections of fat in cellular spaces identical with fat deposited in any part of the panniculus adiposus. They showed no degenerative changes and appeared as a distinct type of tumor; that is, a fibrolipoma.

One tumor was found with a tuberculous ulceration acquired by contiguity from tuberculosis of the fallopian tubes.

REMOTE EFFECT OF DEGENERATION

For years it has been repeatedly asserted that fibromyomata, particularly when in a state of degeneration, produce a deleterious effect on the heart. In this series there were but 12 patients in whom any affection of the heart was noted in the routine examination. Two of these were in a state of decompensation; 2 others revealed marked generalized arteriosclerosis, and 2 were cases of mitral stenosis. A larger number of patients complained of dyspnœa which might easily have been due to either the anæmia or the huge size of the tumor. In 10 other patients the systolic blood pressure was elevated above 155 millimeters. A total of 22 patients, or about 10 per cent, showed evidence of cardiovascular disease. As regards the urinary tract, 3 patients had albuminuria, 1 of whom died from nephritis a few months after operation; 2 had hydronephrotic right kidneys presumably due to pressure of the tumor on the ureter; 6 had a persistent pyuria from cystitis. The effect of a degenerating fibromyoma on the general health is certainly not marked. With red degeneration there is definite evidence of toxic absorption which may continue for several months, producing symptoms of mild toxæmia. In the necrotic submucous type the patients are very anæmic from the direct loss of blood, and may also have the usual symptoms of a subacute focus of infection, namely anæmia, malaise, fatigue, and a low fever. Suppuration in a fibromyoma of course produces rather serious symptoms. With these exceptions there is no demonstrable constitutional effect from degeneration of a fibromyoma.

SUMMARY

Gross degeneration occurs in approximately 13 per cent of fibromyomata. Two hundred specimens of grossly degenerated fibromyomata of the uterus were reviewed and the degeneration classified as follows: hyaline, 24 cases; œdematous, cystic, and myxomatous, 80; red degeneration with total necrosis, 33; calcification, 39; infected, subserous and interstitial, 3, and submucous, 13; miscellaneous, thrombotic sinus, 5, tuberculous, 1, and fibrolipomatous, 2.

Œdematous, cystic, and myxomatous degeneration are a part of the same pathological process, probably due to a gradual diminution in the blood supply. There are no clinical symptoms peculiar to it.

Red degeneration is an aseptic necrobiosis characterized by fatty degeneration, throm-

bosis of the vessels, extravasation of red blood cells, and blood pigment. Pathologically it is a "red infarction," and can be explained by a sudden complete vascular obstruction affecting chiefly the venous system. The end-result is a total fatty necrosis with transformation of the hæmosiderin into hæmatoidin, and subsequent calcification. The occurrence of symptoms depends on the size of the tumor and the acuteness of the necrosis. There is local pain and tenderness, and a mild toxæmia.

Infection following necrosis of a submucous fibromyoma is very distinctive and probably accounts in itself for all symptoms.

Calcification, which occurs in two forms, the peripheral deposition in a totally necrotic fibromyoma, and the bone-like formation scattered throughout the tumor, has little clinical significance.

There is little evidence that the degeneration of fibromyomata produces a toxic effect on the other organs.

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FURTHER EXPERIENCE IN CANCER OF THE BREAST[1]

By BYRON B. DAVIS, M.D., F.A.C.S., Omaha, Nebraska

FOR several years I have been writing articles on the results obtained after operations for mammary carcinoma. The percentage of 5-year absence of symptoms has been higher than the facts seem to warrant. In all probability, in these former reports, some cases may have been included the malignancy of which was doubtful, and thus the percentage of 5-year cures claimed has been higher than it should have been.

In the present review of cases I have tried to do away with this element of error by ruthlessly excluding from consideration all cases about which there could be the least doubt. Each case which has been included in the group reported must fill the following requirements: first, it must be clinically malignant; second, it must present macroscopically the appearance of carcinoma; third, it must satisfy the pathologist by presenting the microscopic picture of lawless epitheliomatous activity. Several cases which seemed clinically malignant even having the gross appearance which confirmed the clinical diagnosis were found by the pathologist to lack sufficient evidence. In a good many cases which the pathologist pronounced carcinoma clinical evidence was not sufficient to confirm the diagnosis. These cases have all been thrown out and only those used that meet the rigid requirements laid down.

Only one exception has been made to this rule; even though a case might not pass muster as carcinoma, if the operation was followed by recurrence and death, the condition obviously must have been carcinoma in the first place and raises the death rate. Two cases of this kind are included which would have been excluded if the patients had recovered. It is probable that some that have had no recurrence and were not counted because of lack of complete evidence were really suffering from carcinoma and should have been given places in this series. It is certain there are borderline cases in which pathologists may have an honest difference of opinion.

Until 1910 all of my cases were not subjected to this rigid set of rules. Therefore, although many patients with undoubted carcinoma of the breast, operated upon before 1910, are clinically well at the present time, they are not counted in this analysis. The group now under consideration includes all the cases of proved cancer, operated upon by me during the years 1910 and 1919 inclusive. None of them, therefore, has survived more than 15 years or less than 5 since operation.

The number is not large but it is believed that it presents a fair group for study. After excluding the only operative death, a woman of 70 who died of acute nephritis, there are 113 patients in the group. Of these, 96 have been traced and seen or heard of recently, and 17 have been lost sight of. Of the 96 patients traced, 49 have died of cancer, 4 are now suffering from recurrence of metastasis, and 43 are alive and well with no sign of local recurrence or metastasis. This gives a percentage of 44.8 that have been free of recurrence from 5 to nearly 15 years.

Of the 49 fatal cases, 30 had definite carcinomatous involvement of the axillary glands, as noted at the time of operation, and in several of them the disease was so far advanced it is probable my judgment was at fault in operating upon them. In very few of the cases now well was enlargement of the axillary glands noted, this constituting another strong argument in favor of operation before the axilla is involved.

In 47 of the fatal cases I have learned that the average length of time elapsing between the operation and death was 2 years and 13 days. Three of the number died within 6 months, 10 between 6 and 12 months, 11 between 1 and 2 years, 10 between 2 and 3 years, and only 13 lived more than 3 years after the operations. The one who lived longest survived operation 7 years and 24 days. With this showing it is questionable whether operation is advisable when the disease is so advanced that hope of cure is nil. I seriously

[1]Read before the Western Surgical Association, French Lick Springs, December 4, 1924.

question whether patients who cannot be expected to be cured should not be advised to have palliative X-Ray treatment and saved from the ordeal of a radical operation. It is certain when the disease is so extensive that cancerous tissue is cut into during the progress of the operation the fatal issue is likely to come earlier than if no operation had been done.

All advanced cases should be subjected to a most searching physical examination and an X-ray of the thorax and skeleton to determine as far as possible whether any metastases are present. An unexpected metastasis may occasionally be discovered, thus positively deciding one against operation. In many of the fatal cases it has not been possible to ascertain the exact cause of death, but 4 have been recorded as having had metastases in the liver and 6 in the lung.

It may be of advantage to review briefly the condition of the 4 cases now suffering from recurrence, all of whom I have seen recently.

CASE 1. Mrs. L. W., age 50 years, was operated upon November 18, 1915. A mass had been noted in the lower outer quadrant of the left breast 8 months before her operation. There was no retraction of the nipple, no fixation to the skin or underlying fascia, and no involvement of the axilla noted. Apparently, at the time of the operation, she seemed to have a good prognosis. I examined her at my office June 1, 1924, and she was found to be suffering from a very extensive local recurrence, the whole left side of the thorax being implicated in a dense nodular infiltration with a small area of ulceration at about the middle of the scar. Radiation treatment was advised but she is failing. It has now been a little over 9 years since her operation.

CASE 2. Mrs. T. A. G., age 45 years, was operated upon March 10, 1916. A lump was noted in the left breast 5 months before. Though there was slight axillary involvement, it did not seem to be a very advanced case. About a year later I removed a small nodule which had appeared in the scar. Healing was complete and I saw her several times between the operation for recurrence and October 2, 1924, when she came to my office and I noted a hard fairly movable mass in the supraclavicular region, also a small firm mass at the lower part of the axilla, somewhat fixed, and another small mass at about the middle of the scar firmly fixed to and involving the rib. As the recurrence seemed too extensive to be amenable to surgical treatment, I advised X-ray, and if the radiologist thought it advisable, to combine radium treatment with the X-ray. She has survived 8½ years since her first operation.

CASE 3. Mrs. E. M. C., age 59 years, operated upon May 16, 1919. The condition was somewhat advanced at time of operation, with slight enlargement of the axillary glands. She was seen at my office September 24, 1924. She came in response to my letter inquiring about her condition. A hard mass, 2 centimeters in diameter was found at the apex of the axilla firmly adherent to and already involving the skin. There was also a pea-sized nodule at the middle of the scar, firmly fixed. She was sent to the radiologist.

CASE 4. Mrs. G. B., age 46 years, was operated upon November 21, 1919. She first noted a mass in the outer part of the left breast 3 months before she consulted me. The nipple was retracted but no notation made of the condition of the axillary glands. I did not hear of her until August 29, 1924, when she came to my office and was found to have a bone metastasis in the upper third of the right femur, proved by the X-ray.

Several other cases may be noted briefly because of facts of special interest pertaining to them.

CASE 5. Mrs. C. H. V., age 28 years, was operated upon July 11, 1917. She came back and was operated upon for rather extensive local recurrence, February 15, 1919. About a month after her discharge from the hospital she died of "flu" pneumonia. Because of the recurrence she is counted as a cancer death.

CASE 6. Mrs. J. H. N., age 42 years, was operated upon December 3, 1919. She also died of "flu" pneumonia March 24, 1922, but as she had local recurrence at the time, she too is counted as a cancer death.

Three were operated upon first for cancer of one breast and came back later with cancer developed in the other breast.

CASE 7. Mrs. H. L. P., age 54 years, was operated upon February 8, 1911. A mass the size of a dollar was present in the upper inner quadrant of the left breast. Twenty-two months later she came back with local recurrence in the operative scar and carcinoma of the right breast. December 27, 1912, radical operation was done on the right side and the recurrent nodule removed from the left side. She died of extensive local recurrence in May, 1913, only 5 months after removal of the left breast.

CASE 8. Mrs. D. B. C., age 48 years, was operated upon November 14, 1913. No glands were noted in the axilla. She returned with cancer in the outer upper quadrant of the left breast and this was removed by radical operation March 8, 1917. It will be noted that 3½ years intervened between her first operation and the development of the disease in the opposite breast. She is alive and thus far free of recurrence.

CASE 9. Mrs. F. S., age 50 years, was operated upon January 11, 1915. This was an advanced case

of carcinoma of the left breast, with axillary involvement. Just a year later cancer developed in the right breast and it was radically removed. She died of lung metastasis about 18 months after the second breast was removed.

CASE 10. Mrs. C. R., age 61 years, was operated upon June 21, 1910. A large mass was present in the right breast with a large adherent mass in the axilla. In clearing the axilla the axillary artery was torn and an effort made to repair the rent by suture. For a day or two the radial pulse could be felt, but later it failed and gangrene of the entire right forearm occurred, for which amputation was done through the middle third of the humerus, July 6, 1910, 15 days after the mastectomy. She recovered promptly and went home but died of local recurrence in May, 1911, 11 months after her operation.

Here is a case of very rapid development and an unusually early fatal outcome:

CASE 11. Mrs. M. A., age 49 years, was operated upon May 12, 1919. She was very sure the mass did not appear in her left breast until 2 months before her operation. Some axillary glands were enlarged but not adherent. There was very rapid local recurrence and she died in August, 1914, about 3 months after the operation and 5 months after the first appearance of the nodule in her breast. The question arising here is: Was this a case of unusual malignancy, or weak resistance, or did I implant cancer cells during the progress of the operation?

All but one of the cases in the series occurred in females. The one male has some points of interest worthy of note.

CASE 12. Mr. J. S. S., age 57 years, was operated upon June 18, 1915. He had noted a hard painless nodule, growing gradually in the right breast for 3 years and 9 months. The mass was found to be the size of a golf ball, very hard, and fixed to the skin. There was also a mass of hard movable glands in the axilla. He came back twice later with local recurrences which were removed and finally died of extensive local recurrence and metastases, October 8, 1918. Postmortem showed nodules in the supra- and infra-clavicular regions, also in the liver and intestines.

The general plan of treatment of mammary carcinoma is very generally agreed upon by leading surgeons, but there are a few points that may be stressed with profit.

1. We all know too well what a high percentage of cases reach the operating table so late that the chance of cure has been seriously jeopardized. Strenuous pushing of the educational campaign carried to the public by the American Society for the Control of Cancer is inducing many women who have discovered a lump in their breasts to consult their physicians promptly. In this respect a great deal has already been accomplished.

It is my conviction that a very brisk campaign among the members of the medical profession is equally important. How often a lump in the breast is treated lightly by the physician when he is first consulted. I would not stop this campaign until every practicing physician regards every lump in the breast as malignant until it can be proved benign. I do not intend a criticism that is unkind. We must remember that when the surgeon is consulted the patient has passed the gamut of the family physician and comes to us as a court of last resort. Naturally we feel the weight of the responsibility put upon us and even then it is often difficult to decide for or against malignancy. It must be remembered that the family physician is dealing with a regular patient, probably an old friend, and often he has been called to see another member of the family, and while there the wife or mother casually remarks that she has something ailing her breast. She often makes light of it because she wants to be reassured. After a very perfunctory examination, or frequently none at all, the anxious one is told not to worry or borrow trouble. With this assurance such a patient will often go for months because she has had her apprehension relieved. In the meanwhile the malignant process, not being susceptible to this form of hypnosis, goes right on infiltrating surrounding tissues and invading the lymphatic channels widely in every direction. Finally this unfortunate woman, seeing that the nodule is growing, again consults her family physician or some other physician and is shocked by being told that she has cancer.

When she finally reaches a surgeon he will probably find retraction of the nipple, involvement of the skin, fixation to the underlying tissues, some hard glands in the axilla, and possibly metastasis to the thoracic cavity, the liver, or the bones. This is not a fanciful picture but an everyday occurrence. It would be much better for the physician to be an alarmist than a procrastinator when the question of cancer is involved. I have much

more respect for the physician who sends me a case of simple mastitis with the diagnosis of cancer than for the one who refers a case of advanced carcinoma with a note saying: "This woman is overanxious so I am referring her to you to be reassured." Every woman with a suspicion in her mind that something is the matter with her breast is entitled to the most careful, painstaking examination of which we are capable.

I am more than ever convinced that every lump in a breast should be regarded as potentially malignant until it is proved to be benign and that every benign lump in the breast, if well defined, should be removed and subjected to careful microscopic inspection. There are occasional surprises in even the most innocent looking breast tumors.

2. No radical operation is justifiable until there is a practical certainty that carcinoma is present. In doubtful cases careful inspection of the gross specimen should be made and a competent pathologist should make a microscopic examination of a frozen section. If this method were generally followed many breasts now removed radically would be preserved and some in which a supposedly benign growth is removed would be treated radically.

3. I am convinced that when the case is much advanced the usual procedure needs modification. The question, "Is this case curable by operation?" is a big one and often hard to answer. It is folly, and utterly inexcusable to subject a woman to radical removal of a breast when she is already suffering from a distant and incurable metastasis. It is therefore important that these patients should be searched in every available spot by all the ordinary methods of physical examination including the X-ray. By this means it is possible to determine lung and bone metastases unless they are very early and not yet capable of throwing a shadow. It is also important to determine if the liver is enlarged and especially if it is nodular. I am also convinced that when the mass is firmly fixed to the chest wall, or there is a fixed mass of glands in the axilla, or there is a definite involvement of the supra-clavicular gland, that no operation or treatment yet devised will cure the patient; and I believe that in most cases patients with cancer thus advanced will die sooner if operated upon than if treated palliatively or let alone.

4. The type of operation performed, when operation is indicated, is of the greatest importance. I have written extensively and perhaps offensively on this subject before, but am impelled to say again that operations for breast cancer are often done in such a way as to do more harm than good. If the malignant tissue is cut and traumatized during the progress of the operation it will probably result in hastening a fatal issue by implanting the disease upon healthy tissue. The rule to cut wide of all tissues that seem in the least suspicious is a safe one and not difficult to carry out, if the case is really operable. The radical operation, if properly carried out, does not furnish the surgeon a chance to see any cancerous area from the beginning to the end of the operation. The lymph-bearing fascia is always under suspicion and the widest removal possible should be the rule. This means the sacrifice of the fascia to the opposite border of the sternum, the fascia covering the serratus magnus, and the aponeurosis covering the upper end of the rectus abdominis and the obliquus externus. All this extensive area is to be removed in one sheet and it should not be cut at any point except at the extreme limits of the area removed.

The axillary dissection is important. No rough handling and no tearing are permissible. Complete exposure by first cutting the humeral insertion of the sternal portion of the pectoralis major and the coracoid insertion of the pectoralis minor will insure good visual access to this most important zone. By beginning at the very apex of the axilla and dissecting the fat and glands in one mass, and using a very sharp knife, every act being guided by the eye, it is surprising how easy it is to clear the axilla. This dissection may be carried medially to include the subclavicular group of glands with their enveloping fat.

5. One of the most troublesome postoperative conditions from the standpoint of the surgeon and of the patient if she lives in the neighborhood, is an arm with limited motion, prone to swell and become painful.

Without going into a discussion of the causes of these disagreeable sequelæ, I want to say that much of this distress may be prevented by one or two very simple expedients. By keeping the arm at a right angle to the thorax during the first 8 or 10 postoperative days, by fitting a good sized pad of gauze, and, by means of adhesive strips pressing this pad firmly enough to eliminate the axillary space, and by instructing the nurse to see that the patient moves her forearm and arm many times daily, putting the hand to the top of the head and combing her own hair as soon as possible, there will usually be little trouble about arm motion and the arm will rarely swell or become painful. Since carrying out all these details there have been very few complaints of painful, swollen, or immobile arms. Patients with cured carcinoma of the breast consider themselves sufficiently maimed because of the loss of the breast without also having troublesome arms.

6. If we are ever going to reach any definite conclusions concerning the care of cancer of the breast it will be necessary to know our results. It is urged in the interest of our patients and of future generations of patients that we keep in as close touch with their progress as possible. They ought to be encouraged to report for examination as often as possible. Every month for the first 3 months, then every 3 months for 2 years or more, and after that every 6 months for as long as possible, they should report either to the surgeon or to the family physician. A careful follow-up on these cases is the only method of finding out exactly what we are accomplishing.

Finally, in studying the subject of cancer one becomes more and more impressed by the difference in results, depending on the degree of advancement of the disease at the time of operation. To make for greater accuracy a standardized method of grouping the cases would be helpful in reaching conclusions of value.

SUGGESTION OF GROUPING

Here is submitted a tentative suggestion of groups based on the local condition and not on the duration of the disease.

Group 1. The very early case. This will include those with a nodule, with no puckering of the skin, no fixation of any kind and no palpable glandular enlargement. Manifestly, this group will require exploratory incision and microscopic evidence to make the diagnosis. A very high rate of recovery, 85 to 90 per cent, is to be expected in this group.

Group 2. The early case. Here the preoperative diagnosis is more certain. There is some puckering of the skin, the outline of the mass is a little less definite, the perfect normality of the neighborhood tissues is not so easy to confirm; but there are no enlarged glands to be felt. The clinical and macroscopical examination will usually determine the diagnosis, but in some cases the microscope will be a necessary aid. The prognosis is still good but a little less favorable than that in Group 1.

Group 3. The midline case. In this group the diagnosis is still more apparent. The puckering of the skin is pronounced. Examination of the axilla may leave one in doubt. If the mass is centrally located, retraction of the nipple may be present. A fairly positive pre-operative diagnosis can be made, and where the mass is cut across, it will show the characteristic cancer appearance. A good percentage of these cases should be cured by operation.

Group 4. The advanced case. One or more of the following conditions will be present: the skin will be sufficiently involved to move with the mass; there will be definite fixation to the deeper tissues; or a positive involvement of the axilla will be manifest. The prognosis is much worse and will be somewhat affected by the presence of one or two or all of the conditions named.

Group 5. The very advanced case. This group includes cases the diagnosis of which may be made by the tyro. The mass is much fixed. There may be discoloration of the skin or even ulceration over the mass, and the axilla contains hard masses more or less fixed. The prognosis of the members of this group will be very bad; much worse, I believe, than most of us have been led to believe.

Group 6. The inoperable cases. Absolute fixation of the breast to the thoracic wall, carcinomatous thickening or nodules extending widely over the chest, extensive ulceration,

a fixed mass in the axilla, a definite involvement of the supraclavicular glands, and more or less wide-spread metastases make the case eligible to this group. Any or all of these conditions render the case hopeless. Only palliative treatment is to be suggested for this group.

It is my opinion that as the results are studied, more and more of the cases in the "very advanced group" will be transferred to the "inoperable group." I am losing confidence in the value of surgery in the cases that already show widespread infiltration.

If we could get on a working basis following out the principles of this tentative grouping, I believe it would be found that as the members operated upon in the first and second groups increase, as they are bound to do, a more optimistic spirit would prevail, and this spirit would filter down into the ranks of the layman, and as a result still larger numbers would come for early operation. As a corollary to this the number reaching the surgeon in the advanced, very advanced, and hopeless state would decrease almost to the vanishing point.

THE TREATMENT EMPLOYED IN ONE HUNDRED AND TWENTY-FIVE CONSECUTIVE CASES OF HEAD INJURIES[1]

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In view of the fact that only 22 deaths in a series of 125 cases of serious head injuries occurred during the past 2 years on the neurosurgical service of Dr. Charles E. Dowman at the Grady Hospital, Emory Division, and in our private practice, a discussion of the principles underlying the diagnosis and treatment employed seems justifiable. As operative measures were employed in only 36 of these cases, the character of treatment employed in a relatively large number of the so-called non-operative cases will be particularly discussed. As this treatment is based upon certain fundamental facts proved by experimental observation, a brief review of the experimental evidence will be given.

Some 113 years ago when John Abernathy wrote his monograph entitled "Surgical Observations on Injuries of the Head" in protest against the propriety and necessity of trephining the cranium under various circumstances consequent upon injuries of the head, as had been taught the surgeons of their respective countries by the members of the Academy of Surgery in France and by Mr. Pott of England, he probably little realized that he had voiced some principles and procedures which a century later would be developed and perfected into a scientific and successful treatment of brain injury.

When we consider that his monograph appeared before Simpson had recommended choloroform as an anæsthetic or Crawford Long had discovered ether, and previous to the researches of Tyndall, Pasteur, and Koch upon which Lister based his investigations leading to the introduction of antiseptics, we can readily see how apropos were his suggestions. In the light of present day results in the management of these cases, we can but marvel at the benefit to humanity that would have resulted during this span of one hundred years had his teachings been accepted and developed.

Several cases described by him fit accurately into classifications used today, while his suggestion of conservatism in operation and the administration of salines form the sheet anchor of our treatment in a certain large class of non-operative cases.

Though he recognized in a practical way the existence of that clinical entity which we know as intracranial pressure, and though much scientific work was later done on the subject by Cromer, von Bergman, von Schulten, Kocher, and Leonard Hill, it was left to Harvey Cushing to furnish us the knowledge of intracranial pressure and to stimulate the experiments of Weed, McKibben, Foley, and Putnam on hypertonic solutions that were des-

[1] From the Department of Neurological Surgery, Emory University School of Medicine. Presented before the Fulton County Medical Society, October, 1924.

tined to point the way to the treatment to be outlined in this paper.

For the successful management of symptoms and complications arising from injuries to the brain, either with or without fracture of the skull, there must be a clear understanding of the principles involved, an accurate mental picture of the symptoms following different conditions, such as depressed fracture, meningeal hæmorrhage, different phases of intracranial pressure, and a logical classification from the standpoint of pathological physiology; the condition of the brain and its membranes being taken into consideration, rather than the obsolete classification of the different forms of fracture of the skull.

In a paper of this scope, it is impossible to consider in detail the various experiments made by different investigators at different times on intracranial pressure, so, for practical purposes, it will suffice to mention Cushing's deductions from observations and experiments regarding this important clinical manifestation.

Though interesting experiments were made with local pressure, the most valuable work was done on general pressure. Through a glass window fastened into a trephine opening Cushing[1] made observations on the effects of intracranial pressure on the blood vessels, as to color, size, etc., and showed clearly that pressure symptoms depended on circulatory disturbances and not compressibility of brain tissue. From his experiments the three following important facts were brought out: (1) Under compression the obstruction to the circulation begins at the venous side and extends backward toward the arterial side; the venous blood is kept inside the cranium and as the veins are the natural exit for cerebrospinal fluid this in turn becomes stagnated and adds to the compression by the resulting hydrocephalus. (2) After the veins are pressed empty, the capillaries and arterioles are gradually emptied, thereby bringing about anæmia exactly at the moment when the force of the compression exceeds the blood pressure. (3) The anæmia in the medulla stimulates the vasomotor center which drives the blood pressure above the compression level. If compression pressure be elevated still higher, the same cycle is repeated until one or two results will ensue: either the compression is gradually lowered with an attendant and parallel lowering of blood pressure or the compression will continually increase until the vasomotor center is forced to give up the struggle and the blood pressure literally tumbles down in its lead to a fatal issue.

While it is true that paralysis of the cerebral cortex may be borne for a long period without direct danger to life, it is equally true that a persistent anæmia of the bulbar centers must eventually lead to death through paralysis of the vasomotor centers. Fortunately an anæmia of the vasomotor center immediately causes, through the splanchnic vessels, a rise in blood pressure sufficient to drive blood through the capillaries, thereby temporarily relieving the anæmia and postponing the inevitable fatality resulting from a persistently increasing pressure. So we see that the sole hope and the imperative procedure in a certain large class of cases is the anticipation of this increase in intracranial pressure and the institution of appropriate remedies to prevent it: or if the patient is seen after the pressure has been established it is the correct treatment to relieve the condition before permanent damage has been done.

The condition of brain anæmia and the dangers attendant upon increased intracranial pressure have been recognized more than 20 years, but the scientific treatment for their relief is of very recent development.

In 1919 Weed and McKibben (8), in studying the pressure changes of the cerebrospinal fluid of animals following intravenous injections of solutions of various concentrations, noticed when they attempted to recover sodium chloride from the spinal fluid (after injections of hypertonic salt solution) that spinal fluid could not be obtained from the subarachnoid space. By using a manometer, they noticed that pressure of the cerebrospinal fluid would be altered very rapidly by injections of hypertonic salt solution. After making this observation, injections were made of isotonic, hypotonic, and hypertonic solutions, cats being used for the experiments. Ringer's solution (isotonic), distilled water

[1] Bryan and Buck. American Practice of Surgery, vol. v.

(hypotonic) and 30 per cent sodium chloride solution (hypertonic) were used. As a result of their observations it was found: (1) Intravenous injection of Ringer's solution causes no lasting change in pressure of the cerebrospinal fluid. (2) Hypotonic solution brings about a marked and sustained rise in pressure of the spinal fluid. (3) Hypertonic solution (30 per cent sodium chloride) causes an initial rise in cerebrospinal fluid pressure, followed immediately by a marked fall in the pressure below zero.

Following the lead of these experiments on the spinal fluid, observations were made by the same authors (9) on the effect of intravenous injections of solutions of different concentrations on the brain, with the following results: (1) The brain of animals receiving injections of isotonic solutions is not altered. (2) Intravenous injections of a hypertonic solution (30 per cent sodium chloride) is followed by a marked decrease in the size of the brain. On opening the skull after such injections, the brain may be seen to fall away several millimeters from the inner surface of the skull; the brain becomes shrunken, the gyri more rounded and the sulci widened.

From a practical standpoint the introduction of such a solution previous to opening a tense dura in cases of brain tumor will frequently prevent a rupture of the cortex, and will also be of signal help in closing a large flap in the presence of intense intracranial pressure.

Thus we are able to apply in the management of these cases the principle of that strange process of nature whereby sap is drawn out of the earth, through which the weaker of two solutions passes into the solution through the membrane separating them.

In order that the above experimental findings be of practical clinical value, it was necessary to learn whether or not the oral administration of hypertonic solutions would produce the same effect as their intravenous injection, so Foley and Putnam, at the suggestion of Cushing, undertook the experiments, with the following results:

1. Following a massive dose of 180 cubic centimeters of 30 per cent solution of sodium chloride given to a dog by stomach tube, the cerebrospinal fluid pressure immediately fell from 150 millimeters of normal salt to zero.

2. Five minutes after an injection of 35 cubic centimeters of a 10 per cent sodium chloride solution by rectum, the pressure began to fall and in 1 hour and 10 minutes had fallen from 112 millimeters to −44 millimeters, a drop of 156 millimeters. The blood pressure remained the same.

3. An injection of 5 cubic centimeters of 30 per cent sodium chloride solution in the duodenum produced a fall of 104 millimeters in cerebrospinal fluid pressure. The changes in spinal fluid pressure were accompanied by a decrease in the size of the brain.

With these findings in mind, Dowman (2) instituted in the Neurosurgical Clinic of Emory University School of Medicine, a hypertonic solution treatment in certain cases of head injuries with brain damage. First he used saturated magnesium sulphate by mouth supplemented by 30 per cent solution of sodium chloride intravenously in certain cases. Later a series of cases was put on enteric coated tablets of sodium chloride.

Though the solution of sodium chloride theoretically offered ideal results there were some drawbacks to be encountered, so Temple Fay (4) set about to make a study of the comparative values of magnesium sulphate and sodium chloride for relief of intracranial tension.

An anæsthetized dog was used. Two loops of small intestines were tied off by a strong ligature to separate them and their distal ends were ligated 12 inches from the original ligature. Equal quantities of a 30 per cent solution of sodium chloride and 25 per cent solution of magnesium sulphate were introduced into the respective loops of intestine. Within 3 minutes the cerebrospinal pressure began to fall. In 15 minutes the loops of intestines were drained and showed that the magnesium sulphate had drawn 72 cubic centimeters of additional fluid from the animal's circulation, while the sodium chloride had drawn only 37 cubic centimeters additional fluid. It was noted that sodium chloride by bowel was often accompanied by discomfort, thirst, and nausea, and that its effects were transitory and not so complete as those obtained by use of

magnesium sulphate. Also after a certain amount of sodium chloride solution had been used, there was a secondary wave of tissue œdema with an increase in intracranial pressure. The explanation of the latter lies in the fact that sodium chloride is dialyzable and is rapidly absorbed in the blood stream, which in turn becomes hypertonic and extracts fluid from the tissue spaces. Some of the fluid, however, is taken into the cells and in time this fixed tissue sodium chloride causes the cells to become distended with fluid. In contrast to this, magnesium sulphate is non-dialyzable and exerts a constant effect on the vascular bed about the intestinal wall, withdrawing fluid from the circulation, with a secondary withdrawal of ventricular and tissue bound fluids, and an attendant dehydration.

For this reason we have dispensed with the use of sodium chloride, except in special indications when quick, though transient, effects will suffice.

In using magnesium sulphate, by way of precaution, the possibility of magnesium sulphate poisoning must be kept in mind, and care must be taken in acute traumatic cases not to confuse the symptoms of intracranial pressure with those of increased tension plus profound shock.

If, as often happens, the patient has lost large quantities of blood or has sustained complicating injuries that have brought on profound shock, then dehydration is contra-indicated, as the depletion of an already impoverished and failing circulation will bring about a fatal termination.

In shock, the respiration as a result of air hunger will be above the normal rate, the temperature below normal, and the pulse rapidly rising. While in increased intracranial tension the respiration will be below normal and the temperature rapidly ascending with the pulse.

There is little possibility of magnesium sulphate poisoning as the toxic dose is large and the effects of an antidote are prompt. This has been demonstrated by Weston and Howard (10) in their experiments with magnesium sulphate as a sedative. They showed that in a rabbit that had developed muscular paralysis following a toxic dose of magnesium sulphate, the paralysis disappeared following an intravenous injection of calcium chloride.

Based on animal experiments, the fatal dose of magnesium sulphate in a man weighing 75 kilograms (165 pounds) would approximate 120 grams (4 ounces) given hypodermatically.

Although up to the present writing no cases of such poisoning have been encountered in our experience, the following picture has been observed in children by Anderson (1). Along with clear mentality, there is marked depression, signs of respiratory failure, slowing and weakening of the heart action, motor weakness of the extremities, but rarely convulsions. With this general picture, there is abdominal pain, nausea, vomiting, rigidity of the abdominal muscles, suppression of urine with high specific gravity, anuria, and usually constipation.

The treatment of magnesium sulphate poisoning consists of elimination by the gastro-intestinal tract, saline infusions, stimulation, and hypodermic injections of dilute solutions of calcium salts. (Ampules of 15 grains of calcium chloride for intravenous administration are put up by several reputable drug manufacturers.)

In our series of cases of head injury we have adhered throughout to the classification as outlined by Dowman (2).

The classification and the respective indications as to treatment are as follows:

Class A. Massive brain injury, with evidence of rapid exhaustion of the medullary centers, and death within one to several hours after admission.

Treatment: These cases are hopeless and operation is contra-indicated.

Class B. Definite evidence of middle meningeal hæmorrhage. As immediate operative interference is imperative, one must keep a clear mental picture of the cardinal symptoms, which are as follows:

1. A free interval of consciousness, often of short duration. In children several days of consciousness may elapse before pressure symptoms develop. On this account children should be kept under the closest observation for several days when the type of injury would lead one to suspect the possibility of extradural hæmorrhage.

2. A slow bounding pulse, following a slightly rapid and small pulse.

3. Stertorous respiration, as contrasted with the superficial respiration of cerebral concussion.

4. The gradual development of hemiplegia or contralateral convulsions.

Treatment: The operation of ligation of the bleeding artery with subtemporal decompression must be done, and done quickly.

Class C. Simple or compound depressed fracture, with localized brain contusion, with or without indriven bone fragments.

Treatment: Débridement is indicated. Contused brain and blood clots are carefully removed by catheter suction. The dural opening is accurately closed if possible and the bone defect is partially filled by replacing the fragments of bone that have been removed.

Class D. Classic manifestations of rapidly increasing intracranial pressure which are well within the period of medullary compensation.

Treatment: Though these cases are in a measure borderline ones and though many would possibly recover without operation, it is our experience that subtemporal decompression, with or without a rubber wick drain under the temporal lobe, offers the best chance of recovery.

Class E. Definite evidence of brain injury exhibiting no classic findings of acutely increasing intracranial pressure, yet of the type that experience has shown is liable to develop gradually increased intracranial pressure due to fluid accumulation.

Treatment: This is the large class of cases previously referred to in which the hypertonic solutions are used with great success. It is the same class of cases as those referred to by Naffziger (7). Though he states that this group is of considerable importance and has attracted no attention, we find that Dowman in December, 1922, described the same condition and offered the same explanation as to how this subdural but extra-arachnoid fluid accumulation has been brought about. In the large majority of this group, it will suffice to give one-half ounce of a saturated solution of magnesium sulphate every 2 hours for 48 hours (smaller doses in proportion for children). After this the interval of doses is lengthened day by day as the patient improves, until the seventh to tenth day, when the hypertonic treatment is discontinued. If, despite the oral administration of magnesium sulphate, there should develop any evidence of increased intracranial pressure, such as bilateral choking, stertorous breathing, etc., this treatment may be supplemented by one intravenous injection of 50 cubic centimeters of a 30 per cent sodium chloride solution for quick effect, followed by intravenous injection of 10 cubic centimeters solution of magnesium sulphate. If, as in a few cases, the pressure symptoms continue and especially a hemiparesis develops, then a subtemporal decompression with rubber wick drainage may be resorted to as suggested by Naffziger. The hypertonic treatment in this class of cases is given with the idea of preventing late pressure symptoms caused by fluid accumulation, and thereby doing away with the necessity of late operations for pressure symptoms.

Class F. So-called concussion with no evidence of gross brain damage. After a few hours these patients are mentally clear and there are no gross neurological findings.

Treatment: Physiological rest and free purgation suffices.

Class G. Depressed fracture of a mild degree, giving rise to no symptoms whatsoever.

Treatment: Though many of these patients appear to be in excellent condition and are free from frank symptoms, it will frequently be found that underlying the depression is much contused brain and blood clot, a condition that may often result in a development of a brain cyst (3). These fractures should be elevated, the dura opened, contused brain, if present, removed by careful catheter suction, the dura closed, and the bone fragments replaced.

Class H. Scalp lacerations without damage to the underlying structures.

Treatment: Scalp injuries are generally treated too lightly. The edges of these wounds should be trimmed away and the wound carefully closed with fine silk sutures. Unless this is done, especially if there is a slight injury to the underlying structures, the condition enters immediately into the Class A of causes of brain abscess as outlined by MacEwen in

his treatise on *Pyogenic Diseases of the Brain and Spinal Cord* (6).

With this classification and brief outline of indicated treatments in mind, I wish to submit the following statistical review:

During the past 2 years 125 head injuries have been treated with 103 recoveries and 22 deaths.

CLASSIFICATION OF THE 125 CASES

Class	Cases	Operations	Deaths
A	20	3	20
B	3	3	0
C	22	21	1
D	1	1	0
E	51	1	1
F	14	0	0
G	12	6	0
H	2	2	0
	125	37	22

Of this entire group as above shown there where 22 deaths, 103 patients making excellent recoveries, only 5 of these showing residual neurological symptoms at the time of discharge from the hospital.

Of the 22 deaths, 20 were in Class A (massive brain injury), which are hopeless.

The 1 death in Class C should really be placed in Class A. This was a gunshot wound of the skull with extensive contusion of the brain, and bloody spinal fluid, accompanied by a blood pressure which fell in 1 hour from 165 systolic over 85 diastolic to 120 over 60. The case was complicated by a gunshot wound of the right eye, requiring an enucleation, the patient living only 2 days after admission.

One case in Class E died in 6 days after admission from œdema of the lungs, the œdema being the direct cause of the death rather than the head injury. This case occurred early in our experience with hypertonic solutions. Thirty cubic centimeters of a 35 per cent solution of sodium chloride were given every six hours. The lung œdema was in our opinion caused by the too free use of sodium chloride. This impression, however, came too late to save the patient. Since this experience the intravenous injection of sodium chloride has not been used in this class of cases.

The 125 cases herewith reported were carefully studied from every standpoint before treatment was instituted. In addition to the usual neurological examination, the roentgen-ray, the ophthalmoscope, repeated blood pressure readings, routine spinal puncture, etc., were employed in an effort to place each case under the proper class. After being thus classified the type of treatment above outlined was instituted. All cases were apparently so seriously injured as to warrant immediate admission to the hospital. Even those cases classified as "concussion" and "scalp laceration" were on admission apparently seriously injured. In view of the fact that there were only 22 deaths in the series, and of the recoveries only 5 showed residual neurological manifestations on discharge from the hospital, it is felt that the classification and type of treatments herein suggested, if rigorously followed, should materially lower the usually accepted mortality rate in cases of this nature.

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DEPARTMENT OF TECHNIQUE

ABDOMINAL HYSTERECTOMY FOR HYDATIDIFORM MOLE

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THE exceptional indication for a mutilating operation in the clinical evolution of a hydatidiform mole seems to be of sufficient interest to merit presentation of the following case before the section on obstetrics and gynecology.

The patient, Sra. de L., 30 years of age, had had ten pregnancies. Two were early miscarriages and eight terminated in labor at term. One of the latter occurred during an attack of lethargic encephalitis which was relieved after several months' treatment.

The last menstruation was January 22, 1924. I saw her in consultation first on May 7 because of obscure pelvic distress. I found a uterus somewhat larger than that which should correspond to the duration of pregnancy. On May 17 and 18 she passed red blood in small quantities, which was repeated in about the same quantity on May 20. On May 23 the loss of blood was fairly abundant. The uterus had enlarged since my examination of May 7 to that of the usual pregnancy of 6 months. No contractions could be felt nor any signs of fetal life discerned. The hæmorrhage reappeared on the night of May 24, in considerable quantity. I made a diagnosis of hydatiform mole and proposed to empty the uterus. The next day the uterus had arisen 2 centimeters above the level of the evening before. That afternoon the patient was taken to the hospital.

The hæmorrhage continued on the 26th. The pulse remained regular and of fair quality, but she had become considerably more pallid in the last 24 hours. Examination in the morning showed a long closed cervix which was dilated up to a No. 12 Hegar and a cervical pack inserted. During this procedure 150 to 200 cubic centimeters of blood were lost. Tonic medication was instituted. During the entire day no uterine contractions were detected. On May 27 examination showed that the pack had dilated the cervix somewhat, but it continued hard and long. I then decided to place an iodoform gauze pack in the lower segment and internal cervical orifice, after first soaking it in a solution of hypophyseal extract. But at the moment of inserting it, the hæmorrhage was reproduced with such violence that I was obliged to change the program of action.

The most formidable hæmorrhages of uterine inertia were no greater than that which was observed here. A bright red stream of 1 centimeter in diameter came from the cervix, so that it was apparent that the patient would soon bleed to death. It was apparent that none of the usual means of stopping these hæmorrhages would serve, so I decided to perform immediate hysterectomy.

The great multiparity of the patient did not prevent her from having a rather long and small vagina. She was also very obese. The size of the uterus, 3 centimeters below the umbilicus, together with the other findings indicated that the operative procedure would probably be more than she could stand. Although more traumatizing, I decided to employ the suprapubic route.

Assisted by Dr. Romeu the uterus was exposed by paramedian infra-umbilical incision. It was soft and congested with markedly dilated vessels so that the usual anatomic appearance was much distorted. The ovaries were somewhat enlarged and polycystic. Subtotal hysterectomy of the Kelly type was performed in a few minutes and the cervical stump peritonized. There was doubt of the asepsis of the blood which section of the cervix allowed to escape into the peritoneal cavity, so that a cigarette drain was placed at the inferior angle of the wound. This was removed on the second day. During the first day after operation subpectoral saline with adrenalin and a Murphy drip of glucose solution were administered. She reacted promptly and convalescence was uneventful except for infection following hypodermics of camphorated oil.

An idea of the magnitude of the anæmia and subsequent improvement is gained by the following examinations of the blood: May 30, red blood cells, 2,800,000; white blood cells, 12,000; hæmoglobin, 35 per cent; color index, 0.62. June 23, red blood cells, 2,800,000; white blood cells, 13,000; hæmoglobin, 50 per cent. July 30, red blood cells, 4,450,000; white blood cells, 6,300; hæmoglobin, 73 per cent; color index, 0.86.

Examination of the specimen showed the uterus to be completely filled with the tumor mass, and among the parts were abundant blood clots. On the right side the mole was separated from the uterine wall by a clot which filled a third of the cavity and was prolonged below the limit of the surgical excision. The uterus and adnexa were submitted to histological examination.

These tumors have been followed through clinical evolution so many times that as soon as their presence is suspected or confirmed, it constitutes an absolute indication for the evacuation of the uterus. The usual method is removal of the growth by the vaginal route. But our case shows that occasionally we may be forced to employ the more radical operations. Whatever may be the fear of a later chorio-epithelioma, the records in numerous cases of hydatidiform mole authorize us not to favor radical operations on this account.

So curious a coincidence as polycystic degeneration of the ovaries does not of itself justify

hysterectomy. The very interesting work of Italian gynecologists has incited us to observe the development of ovarian lesions for some time before practicing radical intervention. Numerous cases of spontaneous and rapid reduction in size of the ovaries after expulsion of the mole minimizes the gravity which was attributed to this condition by the writers who first described the association of hydatidiform moles and polycystic ovaries.

The infrequency of the indication for hysterectomy is shown by the scarcity of publications. This is the only case in which I have practiced it in 30 years of gynecologic practice. The subject has been discussed in our gynecologic societies in former years without any mention of hysterectomy, although most of our members have seen them in practice. Findley studied a collected series of 500 hydatidiform moles, finding 20 abdominal hysterectomies, 2 cæsarean sections, and 3 vaginal hysterectomies. The percentage of operative interference, 5 per cent, seems much higher than usual in these cases and is probably due to the fact that only those cases have been published which have been of unusual clinical interest.

We may then affirm that in the evolution of a mole, only exceptionally need we resort to hysterectomy. Having decided upon hysterectomy, which route should be followed? In view of the good result obtained in this case, I am of the opinion that all cases in which the uteri do not reach beyond half the distance from the symphysis to the umbilicus the vaginal route is preferable. In a very lean patient with a large vagina probably the limit could be raised to the umbilicus as advocated 25 years ago by those eminent teachers, Peau, Segond and Quénu. Obviously the vaginal route is less traumatizing and infection less likely. We should bear in mind that the clots which fill the cervix are far from aseptic.

The capital indication for hysterectomy is without doubt uncontrollable hæmorrhage. But, as pointed out by Vineberg, when the excessive thinning out of the uterine walls makes curettage a difficult and dangerous task, and when fragments of the mole remain inside which can be extracted only at the cost of greater destruction, we should more correctly incline to radical operation. Hysterectomy must also be considered when the length and closure of the cervix as well as resistance to dilatation makes us suspicious of serious difficulties in completing evacuation. Our scruples about the indications for the mutilating operation should also be influenced by the fact that those patients having moles are usually multipara who have fulfilled their social missions.

Should the ovaries be extirpated in all cases? This question cannot be definitely answered. The spontaneous disappearance of cystic degeneration of the ovaries imposes a moment of reflection. If the ovaries appear normal or but little changed and when the patient is young, extirpation should not be practiced. On the other hand, when the ovarian masses are large and especially when papillary formations are observed outside of the cysts and when ascites is present, excision is indicated, since a tendency toward malignancy must be presumed.

We should also resort to hysterectomy in the patient whose molar expulsion we have not personally supervised when the uterus remains large and bloody. Such patients are clinically upon the threshold of chorio-epithelioma.

CONCLUSION

In conclusion, the indications for hysterectomy which we propose and which are illustrated in this case are great multiparity, evident mole, cervix long and closed, uncontrollable hæmorrhage, and intense acute anæmia.

RECONSTRUCTION OF A LARGE DEFECT IN THE POSTERIOR URETHRA

Report of a Case

By E. P. QUAIN, M.D., F.A.C.S., Bismarck, North Dakota

A NEW technique for the reconstruction of a large defect in the deep urethra appeared in medical literature in December, 1923, just in time to become of use in the case which is reported. McGowan, of Los Angeles,[1] described a new method of bridging a wide gap between the two ends of a resected posterior urethra by means of the corpus spongiosum. He found that by beginning posteriorly, the corpus spongiosum could be freed from its attachments to the corpus cavernosum almost up to the glans, and yet receive sufficient blood from the arterial anastomoses near the glans to prevent necrosis. McGowan reported several successful results from this method.

J. L., a youth of 22 years, entered Bismarck Hospital, July 17, 1919, suffering from a crushing injury to his pelvis. A tractor engine on which he was riding had tipped over in the field and pinioned his pelvis forcibly against the ground. He was rescued 15 minutes later and reached the hospital 6 hours after the injury.

He had severe pain through the pelvis, lower abdomen and back, and had been unable to urinate since the accident. His pulse was over 120, temperature 100, respirations shallow, and face blanched.

Attempted catheterization was futile. The catheter, failing to enter the bladder, became filled with blood clots during the attempt. Operation was undertaken at once to relieve the urinary retention by suprapubic cystotomy. The subcutaneous tissues were distended with extravasated blood. Because of the marked abdominal symptoms it was deemed advisable to explore the peritoneal cavity. A few blood clots were found in the pelvic pouch, but no peritoneal wound was recognized in the necessarily hurried examination (and no intra-abdominal symptoms or complications of any kind occurred after the operation).

The bladder was distended with bloody urine and clots. No wound could be found in the bladder wall, the blood had evidently come from the prostatic or membranous urethra. A catheter was readily passed in retrograde manner from the bladder and was left *in situ* for permanent vesical drainage. Fracture of the pelvis was strongly suspected and an X-ray film made the next day showed a fracture of the horizontal pubic ramus with but slight displacement and no small fragments.

The patient's general condition, including urinary output, improved steadily. There was a severe local reaction during the first week after operation followed by profuse purulent discharge, both through the urethra and from the suprapubic wound. The urine escaped both suprapubically and through the catheter in the urethra at first, but after 2 weeks, the suprapubic leakage stopped. After 6 weeks the patient began to sit up and urination seemed normal except for a diminution of the diameter of the stream. Vesical irrigations were practiced from the start. Sounds were passed after the second week. The patient left the hospital 8 weeks after the injury.

Two months later he returned to the hospital complaining of great difficulty in passing the urine, which contained pus and occasionally blood. Urethroscopic examination showed a false passage through the prostate. An external urethrotomy was now made and the bladder entered and drained through the posterior urethra. A permanent catheter was successfully placed through the urethra and into the bladder in the proper place. In making the perineal incision, an abscess cavity located partly within the prostate was opened. After 3 weeks, when the perineal sinus showed signs of closing, the passing of sounds was again inaugurated and continued once or twice a week for 2 months.

The patient felt so much improved that he neglected all treatment for a few weeks, but on March 20, 1920, he again returned complaining of a gradually decreasing stream and an increasing frequency of painful micturition. A small perineal sinus had persisted through which pus and occasionally a few drops of urine escaped. Examination showed not only a constantly overfilled bladder but also that the urine passed through the previously noted false prostatic opening. X-ray examination showed a small irregular shadow near the base of the bladder. This was (erroneously) thought to be a urinary concretion which had formed either in the false passage or in the perineal sinus. The belief that it was a calculus was strengthened when, after a few irrigations with a weak solution of acetic acid, the X-ray in later examinations failed to show this shadow. A tender indurated mass was present deep in the perineum. A few days' passing of sounds made him so much better that he remained at home for 2 months.

May 24, 1920, he again returned to the hospital with acute and complete retention, the bladder being distended to the umbilicus. The tender swelling in the perineum was still present. A suprapubic cystotomy was again made to relieve the acute retention.

Two weeks later, June 7, a urethrotomy was again made in the perineum, and at the same time a resection was made of a stricture of the membranous portion of the urethra. The section removed was about 1.5 centimeters long. It was in reality only a mass of granulations and fibrous tissue within which passed a very small and crooked sinus, representing the urethra. Since practically the whole membranous urethra was now gone it was necessary to mobilize the bulbous portion sufficiently so that end-to-end approximation could be made. The upper two-thirds of the anastomosis were sutured while the inferior part was left open for direct bladder drainage.

The patient reacted well, and on June 11 the suprapubic leakage stopped, urine escaping entirely through the urethral catheter which was left *in situ* after the operation. The perineal sinus also seemed to be closing. June 18, sounds up to 30 passed easily, and urination was almost normal. The patient was seen in the office nearly every week for 3 months for the purpose of having sounds passed. During this time there remained a small perineal

[1] McGowan. J. Am. M. Ass., 1923, December 1.

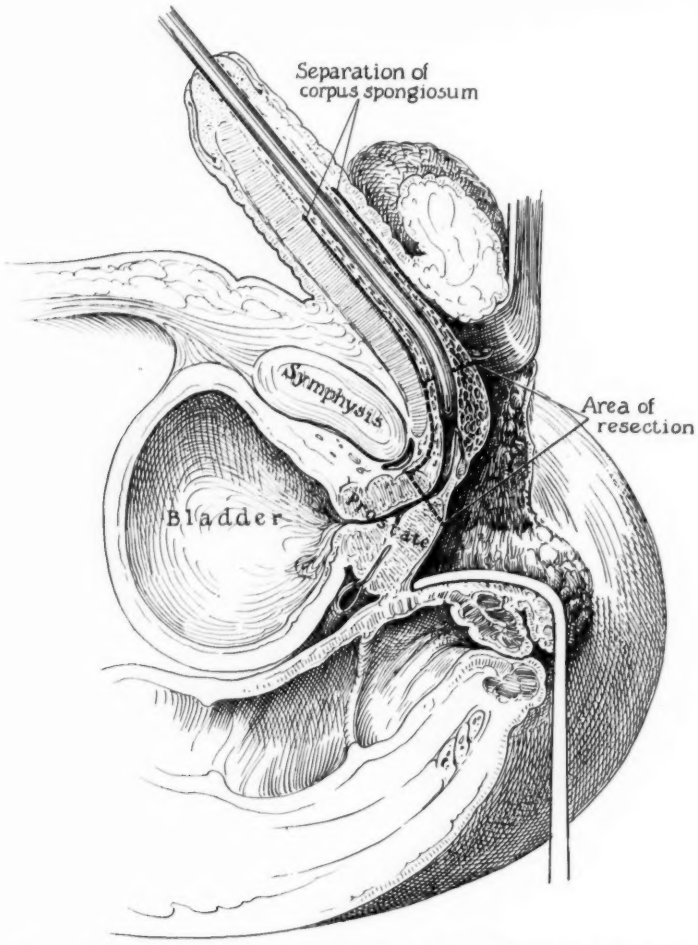

Fig. 1. Showing (1) anatomy of perineal region and approximate extent of (2) urethral resection, and (3) separation of corpus spongiosum.

fistula through which a few drops of pus and urine would escape at each urination.

The patient was seen three times in the year 1921. His condition remained about the same as that just described, except that the fistula would be healed for a few days at a time and then break open and discharge in the same manner as before.

In February, 1922, he came to the office again complaining of pain on urination. The stream had become much smaller and only very small sounds could be passed. The perineal sinus discharged pus constantly, but no urine. There was present a somewhat painful inguinal adenitis.

He felt much discouraged because of his miserable condition and did not submit to any further treatment until December, 1923, when he entered the hospital the sixth time. This time he again had acute retention of urine. The bladder was distended to the mid-abdomen, and in the perineum was a deep sinus discharging pus freely. Efforts at catheterization were futile. Neither sounds nor filiform bougies could be made to enter the bladder. It was, therefore, necessary again to make a suprapubic opening through the old scar. Roentgenograms made at this time showed again the same shadow which had been noticed in March, 1920. By means of a probe passed through the perineal sinus and deeply into the region of the prostate, a loose, hard body could be felt. The sinus was opened sufficiently to admit a small artery forceps and a small bone sequestrum 1 centimeter by 1 centimeter by 2 millimeters was removed. The perineal sinus now healed up promptly and the previous tumefaction and soreness disappeared entirely, and for the

first time, from the subprostatic region. Had it been recognized earlier that a bone fragment separated from the site of pubic fracture had become a foreign body and a focus of infection, the length of disability might have been much shorter and the treatment greatly simplified.

There remained, however, a total obstruction to all efforts at finding a urethral passage to the bladder. All urine escaped through the suprapubic route. In view of the dense scar tissue throughout the perineum, the prospect of a new radical perineal operation seemed anything but inviting. Fortunately, the McGowan operation appeared just in time to become of use in this instance. January 24, 1924, this operation was put to a test on our patient.

Sacral anæsthesia was used. A wide dissection was made of the entire perineum. As nearly as possible all scar tissue was removed. This is equivalent to saying that all tissue in the space bounded by the prostate, pubic arch, skin, rectum, and inferior pubic rami was excised. Much difficulty was met in saving the rectal mucous membrane, because the contracting scar had produced a diverticulum of the rectal wall. The upper end of the urethra was severed well within the prostate capsule. This produced very troublesome bleeding which necessitated hæmostatic suturing of prostatic tissue. The distal end of the urethra corresponded to the anterior part of the bulb, the posterior segment being excised because of its distortion from scar tissue. The length of the gap between the two urethral ends, when all parts concerned were resting without tension, was measured and found to be slightly more than 5.5 centimeters. The incision was now enlarged along the under surface of the penile urethra, the scrotum was split, and the testes separated. The corpus spongiosum was dissected free from the urogenital diaphragm, from the crura penis, and from the overlying corpus cavernosum until a point some distance beyond the middle of the penis was reached. It was then found, as McGowan had stated, that the corpus spongiosum with the contained urethra easily stretched out and could be anastomosed to the prostatic urethra without tension. Tension was further obviated by the fact that the proximal part of the corpus cavernosum bent upon itself and thereby shortened the distance from prostate to glans. There was free bleeding from the urethral stump, showing vascular continuity.

It will not be necessary to detail the steps of the anastomosis. The McGowan technique was

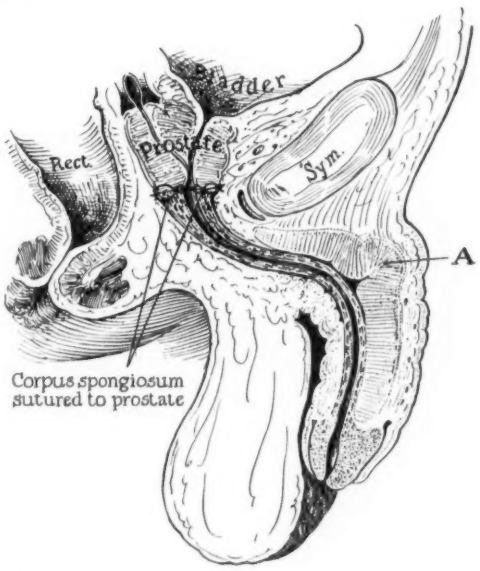

Fig. 2. Reconstructed urethra. Note buckling of corpus cavernosum, *A*.

followed as nearly as possible. It proved to be a very difficult and time consuming operation and required the most delicate instruments obtainable (borrowed from the ophthalmic surgeon). The space around the free urethra was filled with attached fat flaps prepared from the ischiorectal region. The wound was left partly unsutured. The suprapubic vesical drainage was maintained and a small catheter left in the urethra.

The postoperative history was surprisingly smooth. There was a small urinary leakage in the perineum during the second week after operation, but at the end of the third week he could pass and control normally and with a full stream, the solution irrigated into the bladder. Sounds were passed once or twice a week for several months. He was seen last in June, 1925, 17 months after operation, at which time his urination was practically normal.

Tentative evidence of returning potency, absent since the injury in July, 1919, added a much needed psychic relief.

PERMANENT OCCLUSION OF AN INTRACTABLE VESICOVAGINAL FISTULA BY A TRACHELOPLASTIC FLAP

Case Report with Observations on the Omission of the Indwelling Catheter

By ARNOLD STURMDORF, M.D., F.A.C.S., etc., New York

THE ostensible purpose of the indwelling catheter is to keep the bladder empty and thus to secure the immobilization of the wall by obviating physiological contraction and distention.

As a matter of fact, the indwelling catheter does not, cannot, and need not fulfill any such purpose in the postoperative stage of vesicovaginal fistula; the apparent indication is based upon an erroneous conception of the vesical anatomy.

The bladder musculature, like every other muscle plexus, contracts toward a relatively fixed or immobile point. The floor of the bladder, which presents the usual site of fistulous lesions, is normally and under all conditions of contraction or relaxation, the fixed and relatively immobile area of the bladder musculature, thus neither demanding nor permitting any supplemental immobilization.

"As the bladder is emptied, the upper movable portion covered with its peritoneum dips down into the lower fixed portion which lies in close relation to the anterior vaginal wall until it comes to lie within it, as one saucer rests in another. During respiration, the free upper half may often be seen moving on the lower half as if hinged, and the line of demarcation between them may be distinctly made out." (Howard Kelly.)

Furthermore, the theory of adequate bladder drainage runs counter to established hydrostatic laws. The presence of the indwelling catheter within the bladder necessarily gives ingress to air as well as egress to urine. This obviously creates an intravesical air space over a constantly replenished pool of residual urine, only the upper level of which can be drained off.

Every adventitious device, postural or mechanical, calculated to effect a more complete bladder drainage, implies an attempt to create an intravesical vacuum which as an obvious physical sequence must ultimately defeat its own purpose, because the imbalance thus established between the intravesical and extravesical pressure must tend to aspirate the bladder mucosa as well as the urine into the catheter and thus effectually clog all further drainage. A case illustrating our contention is reported.

Mrs. E. N. of New Brunswick, New Jersey, was referred December 30, 1923, by Frank J. Horn of New York City, for an intractable vesicovaginal fistula of 15 months' duration, that had resisted four previous consecutive attempts at closure.

The patient, 36 years of age, of low stature, excessively stout, weighing 198 pounds, married 19 years, had been normally delivered of 6 children, all living and well. The puerperia were uneventful.

Local examination revealed excoriated genitalia and a gaping introitus flooded by a continuous urinary leak. The very deep vagina terminated in a contracted vault which encircled a fixed, partially ablated, eroded cervix. The anterior vaginal wall was furrowed by a wide, longitudinal cicatrix, which dipped into a fistulous funnel, situated about 1 inch from the cervix, giving vent to the entire urinary output.

The patient was admitted to the Woman's Hospital for the first time, May 14, 1924, when the following data of surgical interest were elicited.

Woman's Hospital Record, No. 34,150. Was operated upon in 1908 for pelvic inflammatory disease; again in 1909 for the same condition; in 1914, myomectomy was done, in 1921, appendectomy. Six weeks later, her abdomen was reopened for some complication, the nature of which she does not know.

In 1923, a vaginal plastic and sterilization were done. During her convalescence from this operation she developed urinary leakage for the cure of which she submitted to four consecutive unsuccessful operations, so that when admitted to the Woman's Hospital she had been operated upon six times for various conditions and four times for the cure of the fistula.

On May 15, 1924, I made my first attempt to close the fistula by the Mackenrodt operation. Mechanical difficulties were encountered at each essential step in this procedure. The extreme vaginal depth and cicatricial distortion had drawn the fistulous area to the very limits of operative accessibility. The separation of the bladder from its vaginal and uterine attachments was rendered hazardous by the complete cicatricial obliteration of all normal cleavage planes. The separate suture of the vesical and vaginal defects, without undue tension in either, was finally accomplished and the operation terminated in the customary manner by the insertion of an indwelling mushroom catheter.

Notwithstanding its difficulties, the immediate results of this very arduous procedure justified a conditional expectation of ultimate success. But this attempt, like those made by my predecessor, was doomed to fail.

Within the first 24 hours following the operation, drainage became obstructed by a thick tenacious sediment of sanguineous and phosphatic urinary débris which persisted uninfluenced by all medication throughout the entire convalescence.

In addition to this the excessive adiposity of the patient's thighs, each measuring 30 inches in circumference at the level of the perineum, compressed the catheter on every change of posture so that the constantly recurring obstruc-

Fig. 1. First loop of the silkworm suture passed transversely on the vaginal surface of the flap edge.

Fig. 2. The suture complete before being drawn taut.

tion necessitated repeated manipulations, irrigations, withdrawal, and reinsertion of the catheter, taxing to the limit not only the vigilance and ingenuity of the attendants but the tolerance of the patient's bladder.

On the ninth postoperative day, a suspicion of urinary leakage was corroborated by an inspection of the operative field, which revealed a beginning separation of the suture lines.

The local condition at the time precluded any attempt at immediate resuture. The indwelling catheter was discarded and the patient left the hospital after a 3 weeks' stay with the fistula somewhat reduced in size and the leak diminished in quantity, part of the urine being voided through the normal channel.

When I saw her again 4 months later, the leak had gradually increased and her distressing condition had lapsed into practically its former state. She was placed under active preparatory medical and local treatment for 4 weeks and reentered the Woman's Hospital, where, on October 14, I made my second attempt to close the fistula.

A critical consideration of the evident factors that determined or contributed to the failure of my first operation, forced the conviction that the extensive cicatrization of the anterior vaginal wall and its consequent meager blood supply in the fistulous area, which blanched on the slightest tension, precluded any reasonable expectation of permanent closure by any method of direct sutural layer approximation of the rigid fistular margins, a flap occlusion of some form affording the only solution to this problem.

The other detrimental element that demanded circumvention was that encountered in attempting to maintain the customary postoperative bladder drainage. At no time during the entire drainage period of 9 days following my first operation did the indwelling catheter fulfill its purpose to any evident advantage.

On the contrary, the repeated daily manipulations and readjustments necessitated by its recurring obstruction and its demonstrated failure to drain adequately even when unobstructed, convinced me that its presence in this patient's bladder constituted a positively detrimental element in the after-treatment of the case.

Balancing the theoretical considerations discussed at the beginning of this article in the light of my previous experience, I have found the inference obvious that in successful cases the indwelling catheter is unnecessary and when apparently necessary, is useless.

Thus resolved to omit this time-honored sin of commission, I operated for the second time October 14, 1924, adopting the following procedure, which is practically an extension of the tracheloplastic method published on a previous occasion.[1]

The cervical stump was fixed by two small bullet forceps, one grasping its anterior, the other its posterior lip.

A circular incision, skirting the lowest edge of the cervical margin, penetrated the thickness of its vaginal mucosa. Through this incision the entire vaginal sheath of the cervix was liberated from the underlying cervical musculature as a cylindrical cuff up to the vaginal dome, the dissecting scissors in their upward path cleaving the vesical from the vaginal layer of the fistula.

[1] Gynoplastic Technology. Philadelphia: F. A. Davis Company.

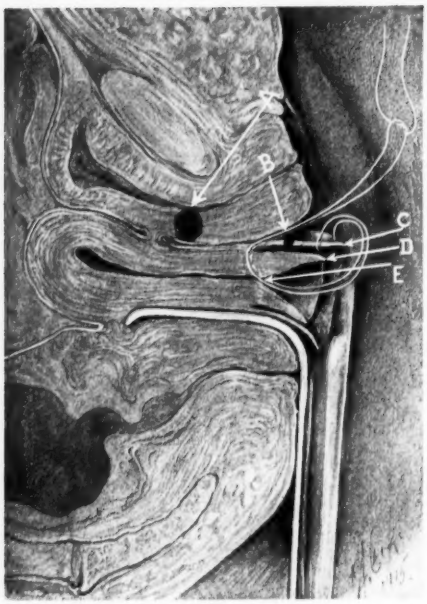

Fig. 3. Schematic view of the suture course in the anterior flap. *A*. Vesical gap of the fistula closed by suture. *B*. Vaginal gap of the fistula transposed downward. *C*. Vaginal mucosa flap edge with suture in place. *D*. Margin of denuded cervical cavity. *E*. Suture course through cervical musculature.

The cylindrical cuff of vaginal mucosa thus liberated was split upward bilaterally for a distance sufficient to yield an ample anterior and posterior flap. The anterior flap was dissected completely from the underlying bladder to the base of the urethra, while the vesico-uterine attachment was severed to the peritoneal reflection. The resulting mobilization of the bladder permitted a ready approximation of the fistulous gap in the vesical wall without undue tension. The entire diseased endocervical mucosa was then cored out, and a raw muscular funnel was left with its apex at the internal os.

The objective in the next step was to slide the anterior vaginal flap over and beyond the fistulous area into the denuded cervical cavity up to the internal os and retain it there by suture, thus substituting a dam of intact vaginal mucosa for the perforated cicatricial tissue at the original site of the fistulous defect and by the same means avoid the unfavorable direct superposition of layer sutures.

This sutural coaptation of the flap was accomplished in a manner identical with that employed

Fig. 4. Traction on suture ends drawing the flap into the denuded cervical cavity to the internal os. *A*. Displaced vaginal gap of the fistula.

in the tracheloplastic method referred to above and detailed here for those unfamiliar with its technique.

Beginning with the anterior flap, a long strand of heavy silkworm gut, threaded in a round needle, is passed on the vaginal surface transversely through the free border of its central tip ⅛ inch from the edge, like the first loop of a mattress suture, the entrance and exit of the strand embracing about ⅛ inch of tissue (Fig. 1).

The right free end of this strand is carried into the cervical cavity to a point just above the internal os where, piercing the cervical musculature in a direction forward, slightly upward and to the *right*, it emerges on the anterior vaginal fornix at the base of the flap. The left free end of the strand, after being carried to the same point within the cervical cavity, just above the internal os, is passed in the same manner, forward, slightly upward and to the *left*, so that, the two free ends, diverging slightly in their transit, reappear on the anterior vaginal fornix, about ⅛ inch apart; where they are left to hang loose for the time (Fig. 2).

The suture course for the posterior flap runs parallel to the above but in a posterior direction, the free ends of the silkworm gut emerging on the surface of the *posterior* vaginal fornix.

By tightening and tying each individual set of suture ends, the vaginal flaps are drawn into the denuded endocervical funnel to the internal os where they are held in close apposition until union is assured about 3 weeks (Fig. 3).

For greater facility and control in directing the transcervical course of the suture a specially modified Peaselee needle should be substituted for the round needle, after engaging the first loop of the suture at the free margin of the flap (Fig. 4).

In sliding the anterior vaginal flap to its anchorage within the cervix, the site of its fistulous perforation was transposed from the original position over the bladder defect to the margin of the external os over the solid cervical musculature. A few supplementary catgut stitches uniting the trimmed lateral edges of the flaps brought the operation to a close.

The comparative ease and facility of each step in this procedure presented a striking contrast to the difficulties encountered with the Mackenrodt method under identical conditions in the same patient.

As already stated, the customary postoperative bladder drainage by an indwelling catheter was purposely omitted. The patient was to be catheterized only when spontaneous urination was delayed beyond 4 hours. The necessity arose twice during the first 12 hours following the operation. From that time, throughout the entire period of the uneventful convalescence to her discharge from the hospital on the fourteenth day, she voided normally at intervals of from 4 to 6 hours. Three weeks from the date of her last operation, I removed the silkworm stitches and found the flap firmly united throughout its entire extent.

Under the date of December 6, 1924, she writes: "In answer to your letter of inquiry I am glad to state that there is no leak. I pass my urine normally every 4 or 5 hours during the day and do not have to rise for this purpose at night."

In an epicritical retrospect of the procedure adopted in this case, I must confess to some vague preliminary misgivings as to the possible outcome of my departure from standardized methods, but a rather extensive experience with tracheloplasty has tended to convince me that the flap would hold and I reasoned that if the flap holds in its position the urine can not possibly leak through.

The wide area of coaptation in this union, fortified by the angular approximation of the flap in curving from its base to its point of fixation within the cervical cavity at the internal os, offered a degree of resistance to urinary escape sufficient to make it reasonably certain that even in the eventual breakdown of the bladder suture from intravesical infection this resisting flap would dam any possible urinary leak into the line of least resistance, namely, back into the bladder, thus resulting at the worst in an occult, symptomless, vesico*vesical* fistula in place of the distressing vesico*vaginal* fistula.

The proximity of the original fistulous site to the cervix rendered this procedure feasible and I would unhesitatingly adopt it again in any similarly situated fistula.

The marked contrast in the convalescent course of this case with and without continuous bladder drainage has convinced me that the traditional indwelling catheter in the cure of vesicovaginal fistula, is a sanctified relic from the thraldom of antiquated dogma that should be consigned to the limbo of the obsolete.

CONICAL RESECTION OF THE UTERUS WITH ABDOMINAL FIXATION[1]

By JABEZ N. JACKSON, A.M., M.D., F.A.C.S., Kansas City, Missouri

THE technique herewith presented has been used in our work for a period of 10 years. The results in selected cases have been more satisfactory than those offered by any other method with which we are familiar. The experience has been sufficiently extensive and the time test long enough to justify our presentation here.

INDICATIONS

The general indication for this method is found in cases of rather marked relaxation and insufficiency of the pelvic fasciæ and the uterine supports. This condition may be either (1) primary and due to developmental defects, in which instance we find usually only a retroversion with pelvic relaxation; or it may be (2) secondary, a sequence of child-bearing with its stretching of supports, and is then often accompanied by (3) perineal and vaginal relaxation and tears and usually ends in a more or less complete prolapsus. These cases obviously require support from above either with or without repair work below. When the abdomen is opened to effect this support it will be found in certain cases that when the uterus is drawn up sufficiently to take out the slack in the pelvic supports the fundus and perhaps most of the uterus presents entirely outside of the abdominal wall. It is obvious that if this fundus is dropped to the level it would occupy either in an ordinary round ligament operation or in the usual abdominal suspension or fixation operation, the pelvic relaxation will be only slightly, if at all, improved. Furthermore, in many cases the uterus is large and heavy and will produce a rather marked strain on any such support.

In such cases one has perhaps resorted to a supravaginal hysterectomy with fixation of the stump to the abdominal wall. If this is done it is usually necessary to remove the ovaries for if they are conserved their circulation is impaired by the ligatures necessary in the hysterectomy and the chances are that consequent cystic degeneration will follow and a secondary operation be necessary. In case of prolapse, which is usually found in women at or beyond the menopause, the

Fig. 1. Line of incision.

Fig. 2. The peritoneum is closed around the uterus and the suturing of the anterior and posterior uterine flaps commenced.

[1] Read before the meeting of the Western Surgical Association, French Lick Springs, December 5, 1924.

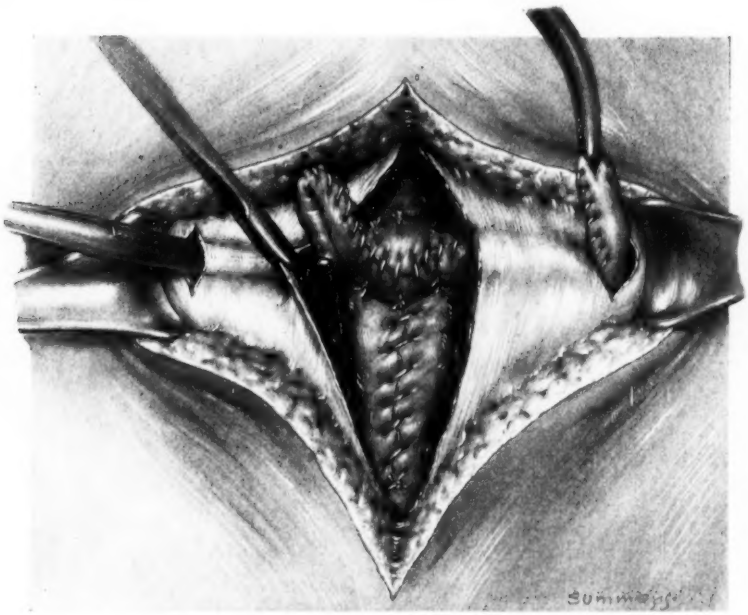

Fig. 3. An undermining incision has been made on either side just above the rectus and a puncture is made about 1 inch outside the median incision.

removal of the ovaries involves no objection if that were the only point. In the other types of cases, however, the patients are usually younger women and we desire to conserve their ovaries. In many instances these patients have had perhaps one or more children, as many as their physical condition permits them properly to care for, so that, in our judgment, they should be sterilized but not by ovarian sacrifice.

Our experience with abdominal fixation of the stump of the amputated uterus has not been very satisfactory. After all it is only a contact or adhesion support and likely to loosen up or stretch with recurrence of troubles. I believe, therefore, that we have the groundwork for a class of cases in which something different is indicated.

We shall make no claim to originality in the principles involved in the technique we advise. The first time we saw an operation which involved conical resection of the uterus with abdominal fixation, the late John B. Murphy performed the operation. After conical resection of the body of the uterus, he simply everted the raw lateral flaps of uterus and fastened them up against the under surface of the abdominal wall. In attempting to follow this operation we found several defects.

1. The fixation was after all but a contact or adhesion fixation.

2. The raw flat surfaces were likely to give a long continued and troublesome oozing of blood with an ensuing hæmatoma unless drained.

3. The open cut cervix often led to a persistent fistula, especially when drainage was used, often opening secondarily where there had been no drainage.

To correct these defects the present operation was evolved. Possibly the problem has been solved likewise by others.

TECHNIQUE

The abdomen is opened by the usual mid-line-suprapubic incision. If there is no other intra-abdominal complication a fairly short incision is sufficient. The fundus is grasped with a double volsellum and drawn up. As we remarked before, in cases in which this operation is particularly indicated the uterus presents well above the abdominal wall. The peritoneum is closed around the uterus, the cervix being caught just above the bladder reflection in front and likewise low down on the cervix behind. The suture is carried on to complete closure of the entire peritoneal incision. The peritoneal cavity is thus opened only momen-

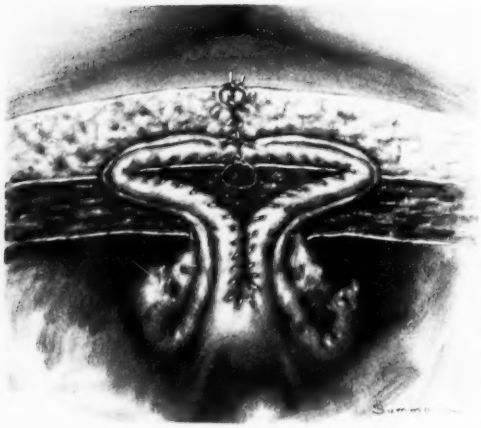

Fig. 4. Operation completed.

tarily, and the remaining work is completed extraperitoneally. The tubes and ovaries are just below the peritoneal suture. We usually now grasp each cornu of uterus with other volsella to hold the organ taut. A conical resection of the body of the uterus is now made well down to the cervix in front and behind, the cutting being done entirely outside the mucosa until the canal is divided at the lowest level. In making this excision the cut is bevelled. The bleeding is remarkably slight. A few vessels on the cut surface may require ligation. A suture ligature which does not slip is best. A few mattress sutures may be used across the bottom of the bevelled flaps to control bleeding further and to approximate the lower portion of the groove. The anterior and posterior edges of the uterine flaps are now sutured together from cornu to cornu, usually with an interlocking suture to further suppress oozing. We now have two finger-like round ligaments on each side with the cervical canal entirely closed over. Before this suturing the mucosal canal is sterilized either with carbolic acid or better with the actual cautery tip. An undermining incision just above the rectus fascia is made on either side and a puncture is made through fascia and muscle about 1 inch outside the median incision. This puncture is made large enough to permit delivery of the tongue-like flaps without strangulation. The delivery of the flaps is usually made with a small double tenaculum passed from without inward, the tip of the ligament (if I may so call it) being grasped and pulled through to the top, as in a round ligament operation. The remainder of our original abdominal incision is now closed in the usual manner. The two uterine flaps are brought over and sutured together in the mid-line and to the rectus fascia. The uterus is thus held up firmly as by ice tongs and cannot get loose. The skin incision is closed as usual with a small drainage of rubber dam to provide for possible oozing.

This operation brings the cervix up to the level of the abdominal wall and effectively takes out the pelvic slack. It is well to remember that the flaps above the fascia will present a small continuous mass which might be mistaken for a hernia by a patient inclined to be uneasy. This can be prevented by proper explanation. The uterine and ovarian vessels are not ligated and the ovaries are left with a normal circulation. The patient is sterilized. Occasionally for short periods of time there may be a slight menstrual flow of blood from the mucosa of the cervical canal unless this is destroyed by cautery. This possibility should likewise be explained.

DISLOCATION OF THE SHOULDER OF SIXTEEN YEARS' STANDING REDUCED BY SUBPERIOSTEAL OPERATION

By ROLAND MEISENBACH, M.D., Buffalo, New York

THE case reported is of significance for several reasons; namely, because of the longstanding condition and the change in anatomical contour of the parts involved.

The patient, a strong, healthy lad of 16 years, gave the history of having had a dislocation of his right shoulder since birth. Whether the condition was postnatal or not could not be ascertained. However, the affected arm was shorter than the other by many inches and this shortening temporarily increased as pressure was borne against the arm involved. Limitation in motion in all directions was noted and the patient complained of weakness and lack of stability in his right arm; therefore, he was handicapped in attempting to move any object of considerable weight.

The freedom of movement which the head of the humerus had during the 16 years of dislocation from the glenoid cavity, caused it to grow rank, irregular in shape, and almost square. Although the humerus was out of the socket and dislocated posterosuperiorly, the arm could be used in certain directions, but any pressure of the hand toward the body would cause the humerus to bulge posteriorly and above the spinous process of the scapula. This bulging was so pronounced that it was evident to the eye in the form of a lump about the size of a small orange and could be seen through the clothing. The free movement of the head in all directions, suspended by the capsule, naturally caused a very distinct thickening of the capsule in its posterior region. At the operation the capsule was found to be at least a quarter of an inch thick and very redundant throughout most of its portion.

On the other hand, the glenoid cavity through lack of function, grew to a lesser degree than the surrounding structures and was somewhat shallow and smaller than normal. From the roentgenograms both these anatomical variations made it at once very evident that a manipulative procedure could not be used to reduce the dislocation, because, mechanically, the head was so large that it could not be forced back into the glenoid cavity.

This case had been seen by several surgeons who very correctly suggested that it could not be reduced, because of the enlarged square head. However, upon closer examination of the roentgenogram, it was noted that the acromion and coracoid processes did not droop very much. If they had drooped; it would have made the consideration of any surgical procedure impossible.

As has been said above, the head of the humerus was markedly square and this gave the opportunity of considering an operative procedure by which the head could be made smaller and still retain the normal muscle attachments as before, at the same time without interfering with the epiphyseal line.

Subperiosteal operation. A curved incision about 15 centimeters long was made on the posterior right shoulder joint, extending from the tip of the acromion process across to the tip of the superior angle of the scapula down to the capsule. It was found that the capsule was very redundant so that when the arm was pushed backward there was considerable play, which allowed the capsule

Fig. 1. The position of the humerus before operation; posterior dislocation. Note square head; also size of head in relation to glenoid cavity.

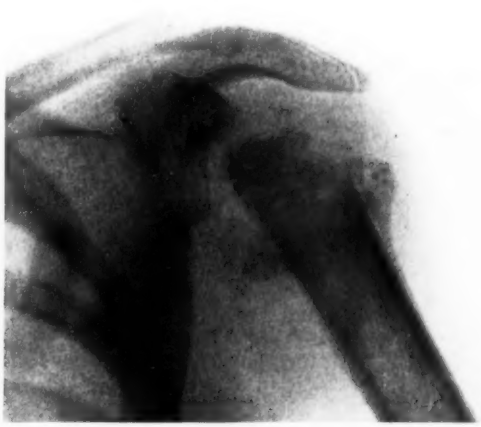

Fig. 2. Shows humerus replaced in glenoid cavity. Note rounded head and normal proportion of head to glenoid cavity which allows full range of motion.

with the head encased to bulge through the incision, so that when the arm was moved in any direction much play was afforded and at the same time the humerus was suspended by the capsule much as in a case of congenital dislocation of the hip joint.

Incision through the capsule showed its thickness to be more than a quarter of an inch over the region of the head. The capsule was drawn across the glenoid cavity and was slightly adherent, but not as much as one would suppose.

After the head had been exposed through the opening in the capsule, with a very sharp carpenter's gouge, the periosteum of the humerus was nicked all the way around, about 1 centimeter below the epiphyseal line of the humerus. At the division of the periosteum and at four points corresponding to the corners of the square head of the humerus, the bone was engaged with the gouge and, with firm and decisive taps of the mallet, a subperiosteal osteotomy was done to remove the sharp corners of the head, at the same time without disturbing any of the soft structures around the joint. The periosteum was then sewed down. By this procedure, the size of the head was materially reduced and rounded and, after the adherent capsule had been loosened with a blunt dissector, the head was easily replaced in the glenoid cavity.

Now that the head had been replaced in the glenoid cavity, the problem arose of holding it so that any backward pressure of the arm would not dislocate it.

The enlarged, redundant, and thickened capsule was made use of by reefing it in such a manner that it closely surrounded the newly formed head and by anchoring both ends of the reef, one in the neighborhood of the coracoid and the other to the acromion process. As the head was forced into the glenoid cavity, it snapped back in position as if it had been in place for the previous 16 years. The incision was closed. Convalescence was uneventful.

RESULTS

The lad has been working for an express company for several years and is now able to push a trunk with both arms with greater strength and has motions in all directions, especially in circumduction which formerly had been limited. The success of the operation depended upon the mechanical judgment as much as the surgical technique. It must be borne in mind that to obtain results in this type of operation the crux of the whole thing is not to disturb any of the muscular or ligamentous attachments. In this operation, the entire procedure of remodeling the head of the humerus was done subperiosteally, with the exception of the original incision and the incision through the capsule. Although a few bone chips remained, they reseated themselves in new positions so that they did not interfere in the least.

CONTROL OF ACCIDENTAL HÆMORRHAGE FROM THE CYSTIC ARTERY

By DUNCAN PARHAM, M.D., Titusville, Pennsylvania

IN the course of an operation for the removal of the gall bladder it occasionally happens that the cystic artery bleeds, either from the failure to catch the vessel on account of its anomalous course or from the slipping of a ligature insecurely tied. A pool of blood quickly forms; rapid sponging may, perhaps, show dimly the location of the hæmorrhage, but the glimpse of the bleeding vessel is so momentary that it is with the greatest difficulty identified and caught.

Such an accident may result not only in a severe loss of blood, but also in injury to the bile ducts, the portal vein or even the hepatic artery. Quick and excited efforts to grasp the bleeding point through a welling field of blood are unsatisfactory and dangerous. At this point a very risky thing is sometimes done. The attempt is made to put a suture through the mass of tissue from which the blood seems to come. Sometimes this is successful; but it may happen that the portal vein is punctured or the common duct included in the ligature.

The following technique is proposed as an effective method of controlling this hæmorrhage so that the artery can be carefully and safely caught. The principle is to control the cystic artery by compression of the hepatic artery. This is done by placing a finger through the foramen of Winslow if patent, and the thumb over the vessels running in the hepatoduodenal ligament. If the foramen of Winslow is obliterated by adhesions, the hepatoduodenal ligament may be grasped *en masse* between the fingers or the vessels may be compressed backward and mesially against the vertebral column. If the hand occupies too much room the incision can easily be enlarged while the hepatic artery is being compressed. If the gall bladder is already stripped from its bed, the field of operation may be mopped dry and kept dry if gauze is held in the oozing bed. Now, by momentarily relaxing pressure on the hepatic artery, a spurt of blood will proceed from the cut end of the cystic artery. The exact location of the bleeding point can be made out by this several times repeated, and forceps placed precisely on the tip of the vessel which is then easily ligated. Abnormalities of the cystic artery will not militate against success as in all cases it must arise from the hepatic artery or its right terminal branch, or run through the hepatoduodenal ligament.

I have not found occasion to employ this method on a human patient nor have I seen it used. A search of the literature reveals no suggestion of such a procedure. However, in repeated experiments on dogs during the past year, it has been uniformly successful, twice when ordinary methods were apparently going to result in failure.

It may be added that in case of postoperative hæmorrhage, the cystic artery may be proved culpable or innocent by compressing the hepatic artery. If hæmorrhage ceases the cystic artery should be found and caught; if hæmorrhage continues the bleeding point must be sought for elsewhere.

EDITORIALS

SURGERY, GYNECOLOGY AND OBSTETRICS

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SEPTEMBER, 1925

POSTGRADUATE MEDICAL EXTENSION TEACHING

THAT extension teaching in medicine for the benefit of the busy general practitioner is practical and gratefully received, is clearly demonstrated in reports presented from Pennsylvania and North Carolina at the last annual conference on Medical Education, Medical Licensure, Public Health and Hospitals. These reports merit careful study. They set forth an idea which is not entirely new, although it has been accorded little general attention in the past.

Probably Wisconsin deserves the credit of being the first state in which a systematic endeavor has been made to maintain a formal teaching program in the home environment of the "family doctor." The University of Wisconsin inaugurated its work in 1914. Other states include Georgia, Indiana, Iowa, Massachusetts, Michigan, Ohio, Vermont, and West Virginia. The highest development has been reached in Pennsylvania, where teaching centers have been established in half a dozen or more accessible points and clinical instruction is conducted by the senior members of the faculty of the Graduate School of Medicine of the University of Pennsylvania.

This being a comparatively untried field in medical education, the efforts have, of necessity, been largely experimental. Quite naturally, therefore, the procedure has varied in different states. In some the state medical society has initiated the movement. In others a university has been the sponsor. Regardless, however, of the responsible body, the objective has remained the same—practical instruction for the busy practitioner.

Therein lies the gist of the matter. The teaching must be adapted to a particular group of men; and their needs, their daily activities and their limitations must ever be in the mind of the professor. So often medical education has for its object a change of status on the part of the student that it requires a special effort to realize that in this instance no such change of status is contemplated. As a general practitioner the student embarks upon his course, and as a general practitioner he concludes his studies, but richer and more capable by virtue of the review and inspiration that he has experienced.

These students are from the great group who have devoted their lives to a homely service for mankind, who often carry out their work without the advantage of hospital environment, who must forego the refinements of laboratory diagnosis, who depend less on great technical ability than on a keen insight into human psychology. Eyes, ears, and fingers are more to them than microscope, X-ray, or electrocardiograph. Elaborate apparatus is of academic rather than practical interest, for they cannot install it in their offices nor carry it from house to house in the course of their lengthy rounds. Yet these men are the first

line of the Nation's defense against disease, for they are the ones to whom the vast majority of patients turn directly in event of sickness or injury. With little time to devote to reading, too busy to seek the university centers for formal instruction, very many of them must forego the stimulus of graduate study unless extension teaching centers are established in their own localities, and the university thus brought to them. The wise teacher will temper his presentation to their needs.

Surveying the work so far undertaken in this country it is apparent that the efforts of the universities have been characterized by a greater impetus and a wider scope in the teaching. One could hardly imagine a more comprehensive program than that inaugurated in 1922 by the University of Pennsylvania. It may well be taken as the ideal toward which to strive. The universities and their faculties of experienced teachers cannot be ignored. They must have a place in this scheme of medical education. However, there is no university in the country which is able to reach from coast to coast. It is doubtful if every one of the 79 medical schools is in a position to undertake extension teaching. The allocation of the country among willing universities is hardly practical. If, therefore, extension teaching is to become widespread some organization of nation-wide scope must assume the burden.

There are several such organizations already in existence: The American Medical Association, The American College of Surgeons, The American College of Physicians. There are also the great foundations, any one of which might well find in such activity a dignified and useful field of labor.

It is earnestly to be hoped that some powerful organization will undertake, thoughtfully and conscientiously, to sponsor this program for the benefit of the general practitioner. For whosoever will directly benefit him will also through him benefit the whole nation.

ETHAN FLAGG BUTLER.

HYPERIMMUNITY PRODUCED BY SURGERY

EVERYONE is born with a certain degree of immunity against disease. If there were no immunity whatever at birth, the child would probably succumb to the inhalation of air, for air contains various pathological micro-organisms which would find very suitable soil in an unprotected individual. Besides this natural immunity, each individual gradually acquires during life an additional immunity. This immunity varies with different infections and gradually diminishes. In some diseases, such as mumps, it remains permanent, in others such as smallpox it lasts for years, while in still other diseases, such as measles, diphtheria and scarlet fever, the immunity lasts a shorter period of time.

The body may also be immunized artificially by vaccines or serums, a method well known to us all. Thus we have three methods of immunization: (a) the natural, (b) the acquired, and (c) the artificial.

Immunization may be produced with an infectious disease, the degree of which may be so slight, the patient may not even be aware of any real illness. A repetition of such slight attacks of infection will gradually produce immunization. This gradual acquisition of an immunity by the patient is his greatest asset in the battle against reinfection by the same disease.

Efforts to cure a patient with an infectious disease are made in two directions: (1) by reducing or checking the disease; and (2) by increasing the resistance of the patient.

Unfortunately it is sometimes impossible to check the progress of the disease. The micro-organisms may have invaded the body in such

large masses and with such force and intensity that the patient is unable to cope with them and in spite of all efforts on the part of the physician, the patient's health declines.

The immunity, however, may be increased in various ways. For instance, by vaccines, fresh air, increased nourishment, hydrotherapy and medications. This increase of immunity may at times furnish that small margin necessary to overbalance the degree of the disease, and in this way spontaneous cures may take place. Very often such cures are credited to psychic influences or to the treatment by charlatans or various cults, such as Christian Science.

When the human body does not respond to any of these aids the problem becomes a very serious one. This lack of response to immunization on the part of the human organism may be due to one of two causes; lack of virility or a faulty mechanism in the formation of antibodies, or to both. Medical treatment thus becomes ineffective.

In such a dilemma we must look to other sources for help. May not surgery help us in such a situation by increasing the resisting power or immunity of the patient? Surgery cannot increase the immunity of the patient, but it can, by the removal of a large part of the diseased tissues decrease the volume of the disease and reduce the toxic products without decreasing, in any material way, the immunizing substances which the body has acquired. For instance, after the removal of tuberculous tubes in tuberculous peritonitis, or the removal of a tuberculous kidney, the patient usually gains very rapidly. And when foci of the same disease exist in other parts of the body, such as a co-existing tuberculous bladder, the latter will heal spontaneously after the kidney has been removed.

In previous discussions, I have illustrated this principle of ***disease versus immunity*** by a debit and credit ledger account showing on the credit side the amount of immunity and on the debit side the amount of disease. A surgical procedure may easily reverse the balance in favor of the credit side sufficiently to produce a cure.

Let us illustrate this principle of "hyper-immunity" with a hypothetical case: A patient afflicted with extensive tuberculosis of his right kidney and a slight affection of his left kidney and bladder, has at the same time scattered foci of tuberculosis in the lung and in other parts of the body. This patient has, as the disease progressed, developed a certain degree of immunity against all foci of the disease; the total immunity, however, is not sufficient to overcome the disease. In other words, the immunization has not kept pace with the progress of the disease. To make this clearer, let us improvise figures to represent the degree of the disease and the degree of immunity and take an inventory of his present condition. In the table below we represent his status in the form of a debit and credit account, placing the units of disease on the debit side and the amount of immunity on the credit side. (See table.)

IMMUNITY BALANCE TABLE

Debit -(minus)		Credit (plus)
Disease	Natural immunity	5
Right kidney 20	Immunity developed	15
Left kidney 4	Immunity developed	2
Bladder 5	Immunity developed	3
Lung 8	Immunity developed	6
Glands 6	Immunity developed	4
Scattered 6	Immunity developed	4
49		39
Right kidney removed −20		
Total 29		
Reserve immunity 10		

The foregoing table shows that the total of the units of disease is 49 and of the immunity only 39. Thus the patient is lacking at least 10 units of immunizing substances to bal-

ance the units of the disease. But he should have more. He should have a surplus of immunity in order to eliminate the disease. How can this increase be effected in this case? By judicious surgery!

Unable to increase the immune substances, surgery reduces the total of disease. In this instance, we remove the largest focus, "the diseased right kidney," which represents twenty units. By doing this we change the balance in his account. He will then have the 39 units of immunity with only 29 units of disease and a surplus of 10 units of immunity. The body is thus brought into a state of hyperimmunity, a condition most favorable for recuperation.

The figures in my table are improvised merely to illustrate the relative status between disease and resistance, because as yet we have no scientific measurements of immunity. Efforts in this field are being made at present by P. Lecomte Du Noüy at the Rockefeller Institute. They will not seem so theoretical, however, when considered with what actually happens in a given case.

A retrospection into the histories of some of our past cases will prove to us the truth of this. We will recall cases when, for instance, an amputation of a chronic suppurative limb produced a spontaneous healing of suppuration in other parts of the body, cases in which the removal of tuberculous tubes produced a complete healing of extensive tuberculous peritonitis, etc. May not this principle be employed more widely if we keep it constantly in our minds? EMIL G. BECK.

MASTER SURGEONS OF AMERICA

HENRY HODGEN MUDD

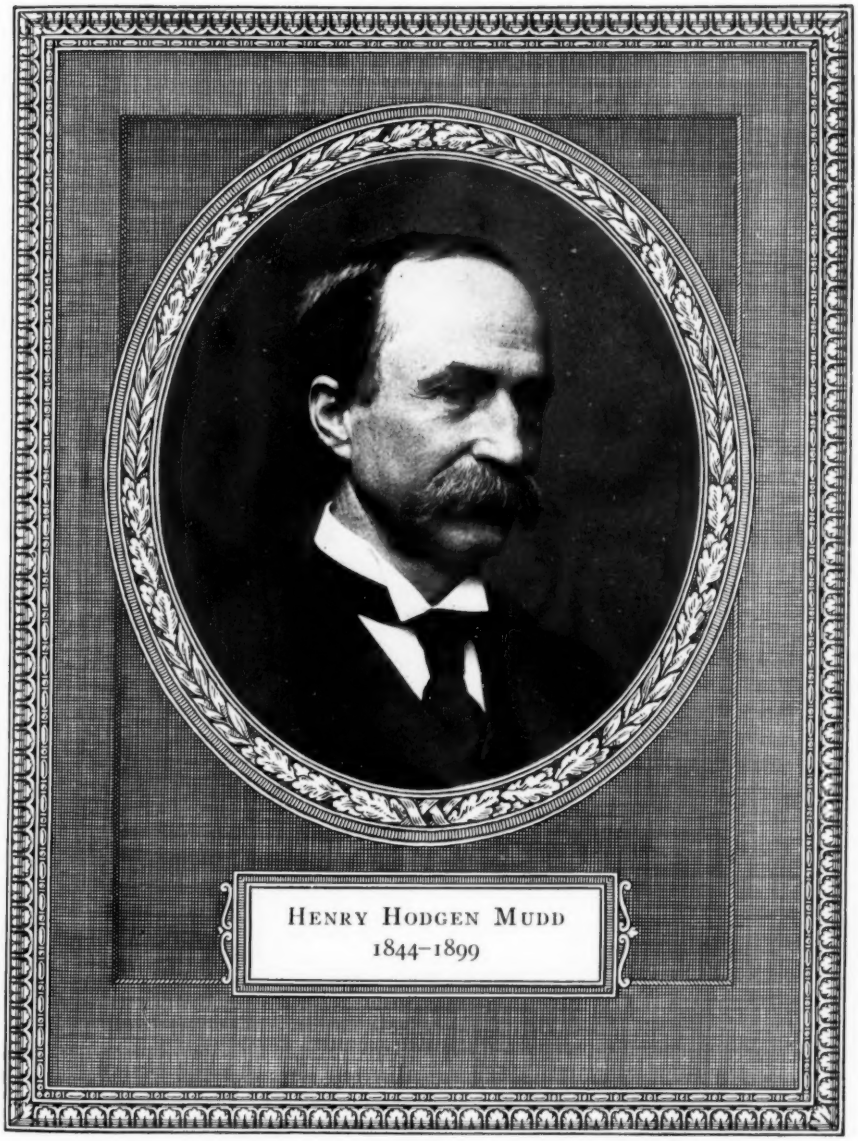
HENRY HODGEN MUDD, eldest son of Henry Thomas and Sarah Elizabeth (Hodgen) Mudd, was born in Pittsfield, Illinois, April 27, 1844. The earliest record shows that in the fifteenth century some members of the family were forced by religious or political persecution to leave Poland and seek refuge in Wales. The history of the family in America goes back to 1634 when three brothers emigrated from Wales to this country, coming over in the service of Lord Baltimore, governor general of Maryland. It is from one of these brothers that Dr. Mudd traces his descent.

In 1856 Dr. Mudd, then a lad of 11, came with the family from Pittsfield to St. Louis, where he spent the remainder of his life. Educated in her public schools and the Washington University, and pre-eminent in her medical circles for many years, St. Louis may justly claim him as one of her distinguished sons.

He received his medical degree from the St. Louis Medical College in 1866 and was immediately appointed interne in the St. Louis City Hospital where he remained a year. In 1867–68 he served as acting assistant surgeon with the 13th U. S. Infantry stationed in Montana. Returning to St. Louis he began civil practice with his uncle, Dr. John T. Hodgen, January 1, 1869.

It was inevitable from his connection with so distinguished a surgeon as Dr. Hodgen that his practice should become more and more surgical and finally be limited to surgery. Success in this field brought him a large practice and a reputation that acclaimed him the leading surgeon of his city and state and made him nationally known.

A skillful operator, careful and conscientious in his work, he possessed unusual surgical judgment, the result of constant study and the knowledge gained by experience. Rationally conservative he was not restrained by timidity or indecision from carrying out whatever measures, however radical, his judgment approved. He could be bold but never reckless and he met every emergency with coolness. In his relations with his patients, honesty and disinterestedness were outstanding characteristics of the man and won for him their confidence and esteem. Able surgeon that he was and exceptional as were his achievements in that line, his most important work undoubtedly was done in the field of medical education.



HENRY HODGEN MUDD
1844–1899

For nearly the whole of his professional life he was connected with the St. Louis Medical College, as prosector and demonstrator of anatomy from 1872 to 1883; professor of anatomy from 1880 to 1883; professor of anatomy and clinical surgery from 1883 to 1886; professor of surgical anatomy and clinical surgery from 1886 to 1890; and professor of clinical surgery and dean of the faculty in 1890. His service as teacher and executive was terminated only by his death, November 20, 1899.

As a teacher his constant aim was to make his instruction practical and helpful to his students and he sought to impress them by the clearness of his presentation rather than by ornate diction or elaborate oratory. His lectures therefore were simple, logical, and full of useful suggestions. He was quick to recognize merit in his students and his quiet smile of approval or occasional word of commendation was valued more by them than would have been effusive praise from others. His influence on them was not confined to the class room, for from his character and example they gained an incentive to uprightness and high ideals which must have had a lasting, if unconscious, effect upon their later lives.

As dean of the medical school his unusual administrative ability and his far-sighted policy made him a powerful factor in the advancement of medical education in the Middle West. It was a time of transition and of increasing demands upon the resources of independent medical schools and he fully realized the necessity of a university connection for them if they were completely to fulfill their obligations. It was in the second year of his deanship that the St. Louis Medical College became the Medical Department of Washington University, a union destined to develop one of the great medical schools of the country.

Dr. Mudd was for many years surgeon in chief of St. Luke's Hospital and through his ability and reputation contributed very largely to its growth and prestige. He took an active part in the work of the St. Louis Medical Society and was its president in 1881. He was also a member of the Medical Fund Society of St. Louis (an organization formed solely for the betterment of medical education), the Missouri State Medical Association, the American Medical Association, and the American Surgical Association.

Dr. Mudd's most important published articles are the one on "Hernia" in *Wood's Reference Handbook of the Medical Sciences*, the one on the "Surgery of the Mouth and Tongue" in Dennis' *System of Surgery*, and the chapter on "Fractures and Dislocations" in Park's *Surgery by American Authors*. Besides these he was the author of many valuable papers read before various medical societies which, unfortunately, have not been preserved.

He was modest in self appraisal, undemonstrative, and somewhat reserved in manner, and his strength of character and the charm of his personality won for him the confidence and affection of all who knew him well.

He was generous and sympathetic and no one who came to him for advice or assistance failed to find in him a wise counselor or ready helper.

He spent his life in service to others. What higher commendation than this can any man deserve!

"For when the One Great Scorer comes to write against your name He writes not that you won or lost—but how you played the game."

When the light of such a life goes out there lingers long in the minds and hearts of those upon whom its light has fallen an afterglow of pleasant memories to encourage and cheer.

JOHN B. SHAPLEIGH.

TRANSACTIONS OF SOCIETIES

CHICAGO GYNECOLOGICAL SOCIETY

REGULAR MEETING HELD APRIL 18, 1925, DR. CAREY CULBERTSON PRESIDING

HÆMANGIOFIBROMA

DR. RALPH A. REIS presented a specimen of a hæmangiofibroma of the placenta from a patient of Dr. Joseph L. Baer at Michael Reese Hospital.

This patient was a ii-para who had had an uneventful pregnancy and went through a short and easy labor, being delivered of a normal, full-term baby. The placenta was expressed after 20 minutes and was found normal in all respects except for a large, hard, smooth tumor on the fetal surface, 6 centimeters in diameter and projecting 3 centimeters above the surface. The tumor was well encapsulated and its outer surface was smooth and glistening. It was sectioned and was red, fleshy, and of cellular appearance. At the periphery there was an irregular yellowish pink area which was sharply demarcated from the rest of the tumor. There were small, firm, circular areas which appeared to be about blood vessels.

The report of the pathological department of the Michael Reese Hospital is as follows: Section taken through the mass shows it to be made up of large numbers of small blood spaces in which quite frequently red blood cells can be seen. In some areas these are separated by an œdematous fibrous stroma, the fibroblasts of which have vesicular active nuclei. Other areas are more cellular and the vessels are represented by endothelial cords. There are some discrete areas of necrosis in which vessels may still be seen and which are sometimes hæmorrhagic. Around the larger vessels there is a well marked tissue envelop which also contains a few vessel spaces. Section through the placental tissue itself shows a normal decidual and fetal picture.

A second case of Dr. Baer's tumor of the placenta, a hæmangioma, was seen shortly after the above case was reported. The patient was a iii-para, who had an uneventful pregnancy and a normal labor, and was delivered of a full-term, normal baby. The placenta was expelled spontaneously and was found to contain a small egg-shaped mass measuring 4 by 3 by 3 centimeters. The mass lay beneath the amnion, was well encapsulated and was differentiated from the remainder of the placental tissue. Section through this mass showed several large vessels and many small, rounded masses of light red tissue which were soft. One large area was firm and hæmorrhagic.

The report of the pathological department is as follows: The tumor is a hæmangioma of the placenta. Microscopic section shows large numbers of closely packed, thin walled blood containing vessels, surrounded by necrotic tissue, which do not stain well. The surrounding placental tissue shows a considerable amount of canalized fibrin and other characteristics of late pregnancy.

CONGENITAL ABSENCE OF BOTH LUNGS

DRS. ALLEN and AFFELBACH: Congenital absence of the lungs is a very rare condition, and we felt that the case that came to us recently should be reported.

In going over the literature we find that Ellis[1] and Levy have reviewed 22 cases of congenital absence of one lung, but there is only 1 case recorded that we could find of absence of both lungs. Schmit's[2] case report is rather detailed and we will review only the most important pathological findings.

The fetus was 44.5 centimeters long, of about 8 months' gestation, and well developed. On either side of the occipital protuberances were small processes of bone encircling the occipital foramen and fused with the second cervical vertebra, probably a rudimentary atlas. The liver extended to the seventh rib on the right side and to the second rib on the left; it had a small accessory lobe on the left side. The foramen epiploica was closed.

There was a rather large cavity in the upper air-passages formed by larynx, pharynx, trachea, and œsophagus. The trachea and œsophagus communicated for a distance of 18 centimeters and the tracheal lumen gradually fused with that of the œsophagus. There were only 10 cartilaginous rings in the trachea and they grew smaller as the fusion with the œsophagus was reached.

There was a complete absence of pleural cavities. The diaphragm was at the eighth rib on the right and at the fourth on the left side.

The space on the left was filled with fatty areolar tissue. On the right side the heart and pericardial sac filled up the space. The aortic side of the heart and the aortic system were normal. The pulmonary artery emptied into the aorta. There was a large patent foramen ovale. There were no openings of pulmonary veins into the left auricle.

The case which we wish to report is as follows:

Mrs. C. D. U., iv-gravida, age 29, entered the Presbyterian Hospital, February 9, 1925. She had had

[1] Ellis. Am. J. Med. Sc., 1917, cliv, 33.

[2] Schmit. Arch. f. path. Anat., 1893, cxxxiv, 25.

two normal pregnancies and deliveries, and one uncomplicated miscarriage. Her last pregnancy ended August 15, 1923, 2 weeks before term after a 4-hour labor. Both previous children were normal. The last menstrual period was March 17, 1924.

The patient went into labor spontaneously February 13, and was delivered of a female infant weighing 5 pounds 2 ounces. The 6-hour labor and delivery were normal, except that the fetal heart tones dropped to 90 immediately preceding delivery. The membranes were ruptured artificially when dilatation was complete.

The baby was pink and made an immediate effort at respiration. Very little mucus was obtained with the tracheal catheter. During the next 20 minutes of artificial respiration about 8 or 10 spontaneous efforts to breathe occurred. Mouth to mouth insufflation was tried but the air returned through the infant's nose and no expansion of the chest occurred. Artificial respiration was continued for 20 minutes after the heart had stopped beating.

The pathologist reported as follows:

This is the body of a white female child 47 centimeters long, weighing 5 pounds. There is a small amount of thin light brown hair on the scalp, 5 to 10 millimeters long. The eyes are blue. Body nourishment is good. The anus is perforate. The bony skeleton is symmetrical.

In the peritoneal cavity, there are about 5 cubic centimeters of clear, light, yellow-brown fluid. There are no gross, noteworthy changes about the upper surface of the liver, spleen, gall bladder, appendix vermiformis, pelvic organs, or of the tissues about the abdominal portion of the aorta. The diaphragm on right side extends up to upper border of fourth rib, on left side to middle of fourth rib.

When the sternum was removed, at least three-fourths of the thoracic cavity was occupied by the heart and pericardial sac. The pericardial sac is broad, extending from the ribs on one side to those on the other. The pleural cavities are empty. The maximum length of the pleural cavity on the right side is 3.5 centimeters, on the left 4.5. The front margin of the pleural cavity is slightly in front of the anterior-axillary line. The posterior and medial boundaries are formed in the usual way. There is considerable fat in the mediastinum in the upper one-fourth. The maximum transverse diameter of the heart is 5 centimeters, the maximum height 2.5. The heart is made up equally of right and left ventricles. The pulmonary artery has no branches and empties into the aorta, at the usual location of the mouth of the ductus Botalli. The foramen ovale is patent and has a maximum diameter of 6 millimeters. There are no grossly visible vessels entering the left auricle. There is no change of the leaflets and cusps of the cardiac orifices.

The wall of the œsophagus is intact throughout its course. The trachea ends blindly at the level of the root of the heart. The circumference averages 8 to 9 millimeters. The inferior end is rounded, but on each side there is a pouch about 1 millimeter deep. The pleural cavities at the level of the inferior end of the trachea are slightly puckered, being drawn toward the midline for 0.5 to 1 millimeter in a place about 2 millimeters wide. Grossly, there is no tissue resembling lung in the pleural cavity, or in the mediastinum about the inferior end of the trachea.

There are no gross malformations of the kidneys, adrenal glands, pancreas, gastro-intestinal tract, uterus, and its appendages, of the organs of the neck and mouth, or the cranium and its contents.

Microscopic examination: In paraffin sections of the lower end of the trachea and surrounding tissues stained with hæmatoxylin and eosin, there is nothing that resembles lung tissue.

DISCUSSION

DR. J. B. DELEE: I would like to ask the members if they have noticed any increase of births of monstrosities of late. We have had during the last 3 or 4 weeks a veritable epidemic of monstrosities. We have had one anencephalus, one encephalocele, one spina bifida, one congenital heart disease with fluid in both pleural cavities in an otherwise perfectly normal baby which without postmortem would have been diagnosed asphyxia, one double congenital hydrothorax, one fistula between the trachea and œsophagus, the baby dying of bronchopneumonia. Yesterday there was another one with an amputation of one leg near the pelvis.

DR. EMIL REIS: This specimen is of the greatest interest on the question of why a baby breathes the first time, a question for which no satisfactory answer exists. Here we have a baby which, according to the report, made an attempt to breathe without lungs. Why does a baby without lungs attempt to breathe? The next question is, when there is no lung in the chest-cavity and the chest-cavity is not completely filled by the heart and the abdominal organs pushing upward, what is in that space not occupied by the lungs? Of course that space may not have been found until postmortem. Before the chest was opened there may not have been any space. That cannot be shown until someone makes a postmortem on such a case and opens the chest under water so no air can get in. Is it possible that there was a vacuum in the chest? Is the chest-wall strong enough to support a vacuum or the explanation of the first respiration based on the disproportion between the space supported by the ribs, sternum, and vertebræ, and the contents of the chest?

DR. N. S. HEANEY: This case is an extremely interesting and rare one. One feature that was striking was that the child was very small, and I felt that the mother must have made a mistake in the time of her last period.

DR. CHARLES B. REED: We have all been assuming the truth of the mechanistic theory that there is an inequality in pressure between the space inside the thorax and the atmosphere outside. I have always been under the impression that the first respiration is due to an accumulation of carbon

dioxide in the blood whereby the respiratory center in the spine is stimulated. The function of breathing is thus inaugurated and air rushes into the chest. I do not believe that the mechanistic theory is correct. The child breathes because the initiation of a new function compels it.

THOMAS J. WATKINS

Dr. Charles S. Bacon presented a short sketch of Dr. Watkins' life following which he offered the resolution:

"The Chicago Gynecological Society desires to express its sense of a great loss in the death of one of its most valued Fellows, Thomas J. Watkins. His skill as a surgeon combined with a fine spirit of research, absolute honesty in his professional and scientific work, and his ability as a teacher were the qualities that gained for him a local, national, and international reputation of the first rank. In this we rejoiced, for his generosity and loyalty to his students and colleagues and his kind sympathy to all honest work made impossible jealousy or envy or any other sentiments than those associated with esteem and affection. His interest in the Society never waned and was manifested by regular attendance and frequent contributions to its programs.

"The Chicago Gynecological Society wishes to inscribe upon its records this appreciation of its Fellow and to express to his family and friends its deep sympathy in their loss, and to offer its congratulations that the memory he has left behind is so pure and inspiring."

CORRESPONDENCE

ELBOW FRACTURES AND DISLOCATIONS

To the Editor: My attention has been drawn to the fact that the splint described in SURGERY, GYNECOLOGY AND OBSTETRICS, vol. xl, p. 673, in my article on "Fractures and Dislocations" was one that had been used in the ward of the Bellevue Hospital for some time and that in the development of the splint Dr. Frederick W. Marx who was on the service at that time, had a prominent part. While the splint has been modified in certain ways and the principle of elastic extension had been used on the service for some years, we wish to give Dr. Marx full credit for his assistance in devising this splint.

IRWIN E. SIRIS.

New York City

BOOKS RECEIVED

Books received are acknowledged in this department, and such acknowledgment must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.

ANALES DEL SANATORIO VALDES. vol. 1. Mexico City, Mexico: Bouligny & Schmidt, 1925.

CHIRURGISCHE PROPAEDEUTIK EINE ALLGEMEINE CHIRURGISCHE DIAGNOSTIK FUER STUDIERENDE UND AERZTE. By Professor Dr. Erich Sonntag. Leipzig: Georg Thieme, 1925.

INTERNATIONAL CLINICS; A QUARTERLY OF ILLUSTRATED CLINICAL LECTURES AND ESPECIALLY PREPARED ORIGINAL ARTICLES. Vol. ii. Edited by Henry W. Cattell, A.M., M.D. Philadelphia: J. B. Lippincott Co., 1925.

DISEASES OF THE EAR, NOSE, AND THROAT. By Harold Hays, M.A., M.D., F.A.C.S. Philadelphia: F. A. Davis Company, 1925.

OPERATING ROOM PROCEDURE FOR NURSES AND INTERNES. By Henry C. Falk, M.D. with a foreword by Eugene H. Pool, M.D. New York and London: G. P. Putnam's Sons, 1925.

METHODS IN SURGERY USED IN THE SURGICAL DIVISIONS OF THE BARNES HOSPITAL, ST. LOUIS CHILDREN'S HOSPITAL, AND WASHINGTON UNIVERSITY DISPENSARY; INCLUDING OUTLINES FOR CASE HISTORY-TAKING, PRE-OPERATIVE AND POSTOPERATIVE CARE OF PATIENTS, ROUTINES, DIETS, ETC. By Glover H. Copher, M.D. St. Louis: C. V. Mosby Company, 1925.

BIOLOGIE UND PATHOLOGIE DES WEIBES; EIN HANDBUCH DER FRAUENHEILKUNDE UND GEBURTSHILFE. Edited by Joseph Halban and Ludwig Seitz. Lieferung 15, pp. 333–556.

A SYNOPSIS OF SURGERY. By Ernest W. Hey Groves, M.S., M.D., B.Sc. (Lond.), F.R.C.S. (Eng.) 7th ed. New York: William Wood & Co., 1925.

A SYNOPSIS OF MIDWIFERY AND GYNÆCOLOGY. By Aleck W. Bourne, B.A., M.B., B.Ch. (Camb.), F.R.C.S. (Eng.) 3d ed. New York: William Wood & Co., 1925.

ENZYME INTELLIGENCE AND WHENCE AND WHITHER. By Nels Quevli, Reg. Phar., LL.B. Minneapolis, Minnesota: The Colwell Press, Inc., Lakefield, Minnesota: Standard Book Company, 1925.

DIE GYNAEKOLOGIE DES PRAKTISCHEN ARZTES. By Dr. Ernst Runge, 2d rev. ed. Berlin and Vienna: Urban and Schwarzenberg, 1925.

DES KINDES ERNAEHRUNG, ERNAEHRUNGSSTOERUNGEN UND ERNAEHRUNGSTHERAPIE. By Professor Ad. Czerny and Professor A. Keller. vol. ii, No. 1. Leipzig and Vienna: Franz Deuticke, 1925.

THE SURGEON'S LIBRARY

OLD MASTERPIECES IN SURGERY

By ALFRED J. BROWN, M.D., F.A.C.S., Omaha, Nebraska

THE PHARMACOPŒIA AND GARDEN OF MILITARY SURGERY

WITH the above as the beginning of its title a most interesting little surgery was published in the latter part of the sixteenth century. The full title, translated rather freely reads: "Pharmacopœia and Garden of Military Surgery containing the instruments and plants necessary to all Surgeons with lists of certain ingredients proper for each organ both medical and mechanical. Dedicated to the high and mighty Seigneur M. François Gouffier, Sire of Crevecoeur, Chevalier of two orders of the King, etc. Further a treatise of antidotes and cure of the Peste and declaration of a question, the whole tried out and brought to light for the use of the public by Esaie le Lieure Surgeon. At Paris by Robert Coulombel rue Sainct Juan de Latran, at the sign of Aldus, 1583, with the privilege of the King."

The functions of a book are numerous and one of the most prominent is its appeal and the reason for this appeal may lie in any one of several things. It may be more understandable to say: "Why do we like this or that book?" It may not be the contents, for many books, especially from the collector's standpoint, have an appeal which has no relation to the contents. Of course, one of the first drawing points is the format, and here is a little book that from its very make-up is attractive. There is something about a thin, small book, just the right size to fit the coat pocket, beautifully printed, whose paper crackles, and whose type is clear and well blocked out on the page that seems to give an invitation which says: "look me over, read me, and see if you cannot find something that you like." It is just so with this little *Garden of Surgery* by an author who is practically unknown. I say this because he is passed over with scant mention by some and wholly ignored by others of the medical historians, in whom we place confidence. But nevertheless the book is fascinating. It makes its first appeal because it looks interesting. Then the title intrigues the curiosity. "Officinne et Jardin de Chirurgie Militaire." Call it pharmacology, pharmacopœia, or dispensatory and garden or what you will, but we get the vision of the garden where the herbs and flowers grow which are to be employed to make the various lotions and ointments to be used on the wounds described by the author, most of which are war wounds, for Lieure was a surgeon who had followed the wars and he tells us that what he advises he knows as the result of personal experience and trial. He shows by his illustrations how the flowers and plants we are to gather appear, so we will make no mistakes and just how we are to use them in making our preparations. In fact the latter part of the book is a miniature Herbal.

In the dedication the author endeavors to stimulate his patron, Seigneur François Gouffier, to follow the example of King Francis I in establishing a school of surgery; this one to be in Picardy, but in this he was apparently not successful. He hints at this but he directly expresses the hope that the dedication of his volume will result in the practice of true surgery in Picardy directed and sustained by the desires and power of Gouffier.

From this we learn that Lieure was a surgeon of Picardy, and here another appeal of this little book enters. The very name of Picardy brings visions of almost all of war surgery. The mind reverts to the days of Crécy and Agincourt, and we visualize King Henry V with his little army of a thousand men at arms and six thousand archers against four times their number of the French weighted with armor, fighting in the mud. Here the wounds were made by the mace and arrow. A little later the first St. Quentin in 1557, where cannon and the harquebusse came into play and wounds such as these of which Lieure wrote were made and treated. Then a later St. Quentin in 1871 with higher powered arms and more penetrating wounds, and finally that line through Picardy from 1914 to 1918, and we think of the Somme and Soissons, Montdidier, and another St. Quentin with the ripping, tearing wounds of shrapnel and shell and high explosive. Through all this period is the search by surgeons for the "Therapia Sterilans Magna"; in the sixteenth century the flowers and herbs of Lieure and in the twentieth inorganic and organic chemical compounds. But let us listen to Lieure on the treatment of wounds. ". . . the first intention of the surgeon consists, primarily, in the ablation of foreign bodies. It is expedient, to begin with the execution of the above intention and this will be necessary not only in wounds made by arquebusses and pistols but also in all others." And he goes on to describe pieces of bullets and darts, and also clothing, harness, and gangrenous, contused, and mortified tissue—all of which must be removed. And then we pass on three centuries and more and after a search of 4 years for the ideal antiseptic, we sum up all he said in the single word—débridement.

OFFICINNE

ET IARDIN DE CHIRVRGIE MILITAIRE

CONTENANT LES INSTRVMENTZ ET plantes tres neceſſaires a tous Chirugiens auec certains cathalogues des ingrediens propres à chacun membre tant ſimilaires qu'organiques.

Dedié à haut & puiſſant ſeigneur M. François Gouffier, ſeur de Crevecœur Cheualier des deux ordres du Roy &c.

Plus vn traicté des contrepoiſons & cure de la Peſte & declaration d'vn Enigme le tout expetimenté & mis en lumiere pour l vtilité du public.

Par Eſaie le Liure Chirurgien.

A PARIS.

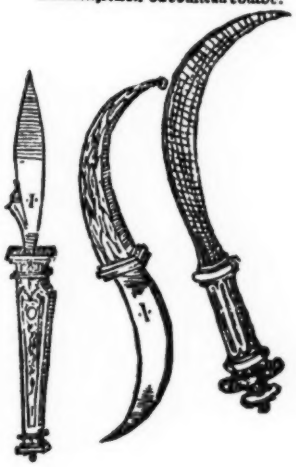
Chez Robert Coulombel rue ſainct Iean de Latran, a l'enſeigne d'Alde.

1583.

Auec priuilege du Roy.

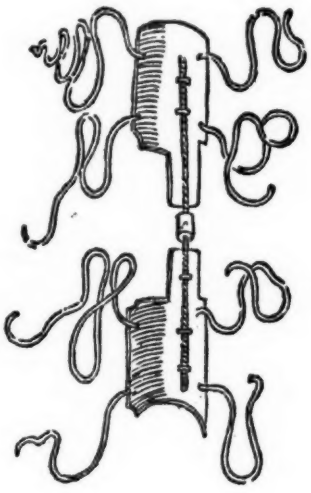
Aguan ou lancette.

Lancette, Raſoir ou couſteau courbe.

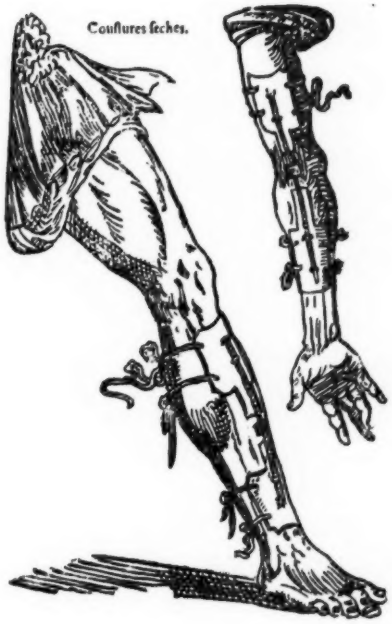


LES INSTRVMENZ DE LA boutiegne militaire.

Couſtures ſeches.



Couſtures ſeches.



REVIEWS OF NEW BOOKS IN GYNECOLOGY AND OBSTETRICS

By GEORGE GELLHORN, M.D., F.A.C.S., St. Louis, Missouri

THE three textbooks before me represent a veritable embarrassment of riches. The work of Graves[1] has made its third appearance. The author looks upon gynecological ailments not as isolated phenomena but sees them in relation to the general organism. There is, therefore, a lengthy introduction of 178 pages—one-fifth of the entire book—which is given over to a detailed consideration of the intimate reciprocal connections between the pelvic organs and the other organs of the body in health and disease. The author himself thinks that this first part of his work would be suited more for the advanced special student and the general practitioner; but I believe that in the instruction of undergraduates one can not begin too early to widen the horizon of the pupil and to teach gynecology, from the very start, as a part of general physiology and pathology. The young physician will then be less apt "to look at the world through a vaginal speculum," as Abraham Jacobi once observed tersely.

The second part deals with gynecology in the usual sense of the word. It represents organ pathology proper and describes the subject in a compact form. The discovery by Sampson of endometrial transplants has rendered necessary many changes in the interpretation of pathological lesions in the female pelvis. Syphilis of the internal organs is another new subject.

In the third part, on operative gynecology, the author presents chiefly those surgical procedures which have proved successful in his personal experience. A large number of illustrations, both in black and in color, many of them from the author's hand, support the lucidity of the verbal expression. The pleasing make-up of the work corresponds with the excellence of its contents.

THE next book is Anspach's *Gynecology*[2] which is now in its second edition. Here, too, we meet with a wider concept of gynecology in such chapters as the hygiene of the adolescent girl, causes of pelvic disorders, backache, etc. I am again impressed, as I was when I reviewed the first edition[3], with the thorough and careful preparation of the work which provides the reader with an authoritative guide to the accurate diagnosis and the successful treatment of the gynecological conditions most frequently encountered. In addition to complete revisions on radiotherapy and perineorrhaphy, numerous new subjects have been embodied, such as the Rubin test, granuloma inguinale, mercurochrome as an intravenous antiseptic, varicocele, protein-therapy, etc., and the bibliographic references at the end of each chapter have been brought up to date. The author's own researches, particularly in the field of the metropathies, should receive special mention. The work possesses all the qualities of a helpful textbook for students and practitioners.

BLAND'S *Gynecology*[4] is a newcomer in the literary field and, for that reason, is entitled to a more detailed review. The book is composed of 29 chapters of which the first nine may be considered the introductory part of the work. The first chapter deals chiefly with the phenomena of puberty and menopause. The second chapter presents a lucid survey of the various causes of genital disease. In the following chapter on symptomatology, the author stresses the importance of careful observation of the patient as a whole and the exercise of judicious judgment. "The recognition of a single lesion must not be accepted as a necessary explanation of all the associated symptoms." There is also a good diagram which shows, at a glance, the relations between local and general symptoms in gynecological ailments. The next chapter gives very clear descriptions of the various diagnostic methods; among the newer means, roentgenography and pneumoperitoneum, the Rubin test, and Heineberg's uteroscopy are highly recommended. In contradistinction to this progressive attitude, the advice to introduce the uterine sound merely under the guidance of the fingers strikes the reader as a backward step into the days before asepsis. A separate chapter is devoted to the exploration of the urinary tract. The following chapters deal with pre-operative routine, postoperative treatment, and postoperative complications. A lengthy chapter on non-operative treatment follows. The author is somewhat apologetic about devoting so much space to conservative therapy, but he may rest assured of the approval of those who realize that the pendulum is swinging back from the former, almost exclusively surgical, treatment of genital disease. In the second part of the book the author presents, in separate chapters, disorders of function, malformations, traumatisms, inflammations, ectopic gestation, and tumors. Whenever possible, he considers the various morbid conditions in sequence from the vulva to the pelvic cellular tissue, a plan which lends itself well to the discussion of such processes as inflammations, tumors, and injuries.

Extensive personal experience, clear diction, and an abundance of illustrations combine to make the book helpful to the general practitioner and the specialist. Yet, there are some criticisms which

[1] Gynecology. By William P. Graves, A.B., M.D., F.A.C.S. 3rd ed. Philadelphia and London: W. B. Saunders Company, 1923.

[2] Gynecology. By Brooke M. Anspach, M.D. 2d ed. Philadelphia and London: J. B. Lippincott Company, 1924.

[3] Surg., Gynec. & Obst., 1921, xxxiii, 89.

[4] Gynecology; Medical and Surgical. By P. Brooke Bland, M.D. Philadelphia: F. A. Davis Company, 1924.

might be considered in a future edition. The weightiest is, to my mind, the overly large size of the volume. There is much that could be eliminated to render the tome less bulky. For instance, the author, justly, considers the Alexander-Adams operation obsolete, yet, he devotes several pages and illustrations to it. In another place, he advises, again very properly, against the use of the sound in replacing a retroflexed uterus but inserts a picture of the procedure. The technique of the Wassermann test is described in greatest detail though this procedure will hardly ever be carried out by the clinician and should be studied in special works. On the other hand, certain essential subjects are barely mentioned. This refers, in particular, to anatomy and embryology regarding which the reader is referred to standard books. Of the subject of syphilis, little more than condyloma is considered. Reference to psychotherapy is also much too short and indefinite. There are other, minor criticisms. One might object to the term "surgeon" being used synonymously with "gynecologist," or question the use of silver nitrate in tuberculous cystitis. I mention all this in a very friendly spirit because I think that this is essentially a good book which, by a thorough revision, can be made decidedly more valuable.

EVER since its first appearance in 1905, the *Operative Gynecology* by Doederlein and Kroenig[1] has occupied the leading place among works of this kind. After Kroenig's death, Doederlein, in 1921, brought out the fourth and has now brought out the fifth edition. There is about this book an indefinable sense of quiet authority born of vast experience, supreme skill, and mellowed judgment. The illustrations have become the envied model for all gynecological books. I still believe, as I said in a previous review,[2] that this work is indispensable to the modern gynecologist and surgeon.

WERTHEIM'S plan to write a book on his own operative technique was frustrated by death. Weibel, for many years Wertheim's associate, has carried out the idea as a fitting memorial to his teacher. There has resulted a book[3] of some 250 pages in which the written instructions are pleasingly clear and precise and the numerous illustrations of the various operative steps excellent and instructive. In a book so personal in character, one naturally looks first for the two methods which are most intimately connected with Wertheim's name: the radical hysterectomy for uterine cancer which Wertheim made popular though he did not originate it, and the interposition operation which he devised simultaneously with our own Watkins whom we have lost only a few weeks ago. Wertheim's cancer technique can now be found, both in word and in picture, in every gynecological textbook in any language. What was new to me, was a special procedure of dealing with a case of cervical cancer which has involved the greater part of the vagina. I was equally interested in Wertheim's method of remedying recurrence of prolapse after the interposition operation, a complication which occurs not too infrequently. Other original procedures described are Wertheim's methods of shortening of the round ligaments and of the sacro-uterine ligaments through the vagina. It is manifest throughout the book that Wertheim and his pupils practise vaginal operations to a much greater extent than is the case in this country. However, other methods have not been slighted, so that the reader finds information regarding all of the more typical operative procedures. The author has accomplished his task in a most creditable manner and fully deserves the appreciation of the gynecologic public.

IN the form of a large *Atlas*[4], Liepmann presents, on forty plates, a series of original drawings in natural size of the surgical anatomy and pathology of the pelvic organs. The author has carried out this immense amount of work on altogether 83 female cadavers. The sections and preparations of the pelves were made in a variety of directions—extramedian, sagittal, frontal, horizontal, and transverse. Some of the pictures, for instance those of the pelvic floor, are readily understood; most others require intensive study. This is pre-eminently a work for the experienced operator who, after giving close attention to the drawings, will gain a clear insight into the topography of even the most complicated pathological conditions. Taken together with the well known atlas on prolapse by Halban and Tandler, the plates on the pelvic floor by E. Martin and other pictorial publications, this splendid work of Liepmann furnishes an extremely valuable aid to the technique of gynecological operations. The text is limited to brief descriptions of the illustrations in both German and Latin, the latter, probably, to facilitate international perusal.

ANOTHER book by the same author[5] testifies to the astounding versatility of this prolific writer whose works have repeatedly been mentioned in these columns. I have had frequent occasion to point to the transition through which our specialty is passing. Gynecology, heretofore allied so closely and almost exclusively to surgery, is seeking new contacts with other branches of general medicine, and among these contacts those with neurology are claiming more and more attention. Here and there references and even brief chapters on psychology and psychotherapy in gynecology

[1] DOEDERLEIN-KROENIG. OPERATIVE GYNAEKOLOGIE. By Geh. Hofrat Prof. Dr. Albert Doederlein. 5th ed. Leipzig: George Thieme, 1924.

[2] Surg., Gynec. & Obst., 1921, xxxiii, 89.

[3] DIE GYNAEKOLOGISCHE OPERATIONSTECHNIK DER SCHULE ERNST WERTHEIMS. By Prof. Dr. Wilhelm Weibel. Berlin: Julius Springer, 1923.

[4] ATLAS DER OPERATIONS-ANATOMIE UND OPERATIONS-PATHOLOGIE DER WEIBLICHEN SEXUALORGANE MIT BESONDERER BERUECKSICHTIGUNG DES URETER-VERLAUFES UND DES SUSPENSIONS- UND STUETZAPPARATES DES UTERUS. By Prof. Dr. Wilhelm Liepmann. 2d ed. Berlin and Vienna: Urban & Schwarzenberg, 1924.

[5] GYNAEKOLOGISCHE PSYCHOTHERAPIE. By Prof. Dr. Wilhelm Liepmann. Berlin and Vienna: Urban & Schwarzenberg, 1924.

appear in textbooks; and now Liepmann is, I believe, the first to devote a separate monograph to the subject. He presents his studies in the form of ten lectures. In the first four, the origin of psychic impressions and expressions is shown on a phylogenetic and synthetic basis. In the fifth lecture, the author propounds his basic "law of the triple cause," that is, the combination of three specific features of the feminine psyche, namely, vulnerability, inhibition, and pansexualism. These three causes, again, explain irritability, maternal feeling, inferiority complex, etc.; and we are told in the sixth lecture how they give us an insight into the intelligence and character, in one word, into the personality of woman. The seventh lecture describes how environment affects various types of psychic constitution; while in the succeeding one, the gynecological ailments which originate from a psychic disturbance, are enumerated. These are certain forms of vaginal discharge, uterine hæmorrhages, amenorrhœa, imaginary pregnancy, dyspareunia, vaginismus, etc. The last two lectures, finally, supply the diagnosis and therapy of such psychic gynecological affections.

In trying to formulate my reaction toward the book, I realize that any writer on a new subject is apt to be an extremist. I need not repeat how entirely praiseworthy I consider this attempt at broadening the scope of gynecology from the narrow confines of a surgical specialty. But I am unwilling to accept unreservedly all of the author's conclusions. I cannot concede him, for instance, that a woman with a perfectly healthy psychic make-up would have no inconvenience whatever from a retroflexion or a pelvic peritonitis. His dictum that uterine hæmorrhages "in the majority of cases" are but the pathologico-anatomical expression of the three psychic factors underlying his law of the triple cause, strikes me as an exaggeration. The chapter on gynecological psychotherapy was rather disappointing to me in that it contained nothing that any *good* physician (who, in order to be successful, *must* be a good psychologist) would fail to apply. Nor could it be otherwise. For there can be only *one* psychotherapy, and to speak of gynecological psychotherapy seems to me as illogical as to proclaim the existence of a dermatological psychotherapy. However, the book is by no means superfluous. It will exert its influence in the direction in which the development of our specialty is traveling, and for this reason alone its study is warmly to be recommended.

ABOUT 30 years ago, Hofmeier[1] undertook to re-edit the gynecological textbook of his former chief, Carl Schroeder after the latter's death. The book has lived through an exceptionally large number of editions, and though in the course of years, the work completely changed its character in accordance with the progress of modern gynecology, Hofmeier continued to give faithful credit to the memory and original authorship of his revered teacher. The sixteenth German edition has now appeared in Spanish translation. Hofmeier is universally known and respected as an eminent teacher, a clear and unemotional thinker, a most careful diagnostician, and a progressive operator who, however, insists at all times on very stringent indications for surgical intervention. All these good traits are mirrored in his book. The illustrations are very satisfactory but, it seems to me, not quite numerous enough. The color plates of microscopic sections are beautiful.

[1] TRATADO DE GINECOLOGIA. By Prof. Dr. M. Hofmeier. 16th ed. of the work of Carlos Schroeder. Barcelona: P. Salvat, 1922.

SEVERAL new installments of *Biologie und Pathologie des Weibes*, edited by Halban and Seitz[2] have appeared. As was mentioned in previous reviews[3], I shall for the present merely indicate the contents of each of these installments, leaving a full appraisal of the work until its completion.

Wiesel contributes an essay on the climacterium. Most symptoms of this period belong in the realm of internal medicine. The disappearance of the ovarian hormone produces disturbances in the functions of the remaining endocrine glands, but there is nothing specific about the resulting manifestations. Rather are they, for the most part, an expression of the general constitution, and most of the so-called climacteric symptoms may, on careful observation, be recognized throughout the life of the individual. In fact, the constitution of any given woman permits us to predict years in advance, whether she will be troubled with vasomotor disturbances in her menopause, become adipose, etc. The treatment is largely symptomatic and, on the whole, not very satisfactory. The article is very important and interesting; unfortunately, the style is rather involved.

The bacteriology of the genital tract with particular reference to the question of vaginal discharge is the subject of von Jaschke's contribution. In the origin of simple "leucorrhœa," ovarian function and constitution play a decisive part. This problem, by the way, is so important and still so much in need of clarification that it has been chosen as one of the official subjects for discussion at this year's meeting of the German Gynecological Society. The bacteria of the vaginal flora are innocuous. Admixture with microbes from without constitutes a real danger only if the natural power of defense of the whole organism has suffered. Numerous plates in natural color photography enhance this article which deserves careful study.

Labhardt, in two papers, gives a good survey of all forms of disease of the external genitals and vagina. Some of the color plates are excellent. The therapy, as a whole, is dealt with rather too briefly, particularly as regards operative procedures.

Stransky supplies a paper of 100 pages on medical psychology, neuroses and other psychopathic con-

[2] BIOLOGIE UND PATHOLOGIE DES WEIBES. Edited by Hofrat Prof. Dr. Josef Halban and Geh. Hofrat Prof. Dr. Ludwig Seitz. Berlin and Vienna: Urban & Schwarzenberg, 1924.

[3] Surg., Gynec. & Obst., 1924, xxxviii, 429, and 1924, xxxix, 843.

ditions in women. The diction is none too fluent and the technical phraseology rather unfamiliar to gynecologists; but the reader will feel richly repaid for the extra effort in studying this article for it opens up avenues of new ideas and knowledge. The so-called weaker sex, the author claims, is, in reality, superior to man both psychically and physically, if one only analyzes the situation carefully. He believes that in America the domination of woman over man has reached its extreme expression. The relationship of the two sexes, particularly in psychical and sexual respects, is that of rider and horse. The author studies the psyche of woman as if under a microscope, and what he says of woman in the various stages of her sexual development and activity, of the spinster, of the woman in various professions, offers food for serious thought. The prognosis he gives to women in medicine, is not very encouraging. His excursions into social hygiene, prostitution, and criminality in women are absorbingly interesting.

Kogerer deals with neuroses in connection with menstruation, menopause, pregnancy, puerperium, and lactation, and the legal responsibility of women delinquents during these states. The short article is of considerable importance to the gynecological reader.

Psychoses in women form the subject of Ewald's contribution. The tenor of the essay is this that specifically female sexual psychoses do not exist. Contrary to traditional beliefs, normal or disturbed sexual functions are merely incidental factors in the outbreak of a psychosis. Psychic derangements in men and in women have the same symptomatology and course.

Albrecht presents a concise chapter on psychopathia sexualis. Involuntarily one thinks of Krafft-Ebing's fundamental though rather sensational monograph of the same title and of certain less sincere books on the same subject and in different languages in which many of these sexual aberrations were dished up in a way so as to tickle the eroticism of the reader. There is nothing of this undertone in Albrecht's dissertation. The author maintains that despite a voluminous literature, the subject is by no means thoroughly understood; the main reason is that the sexually psychopathic person, consciously or unintentionally, is only too often a liar. When all is said, we must be contented with knowing that such psychopathic conditions exist, for in the matter of treatment we are practically helpless.

Of far-reaching practical and scientific value is the work by Novak on the relations between the female genitals and the ear, nose, pharynx, larynx, muscles, bones, and gastro-intestinal tract. The author, some years ago, contributed a similar treatise in Nothnagel's great handbook of internal medicine. He has now brought the subject up to date. His encyclopedic knowledge and his amazing industry must fill the reader with honest admiration. It is utterly impossible to attempt detailed excerpts from the mass of valuable information. It is my conviction that familiarity with these borderline or related subjects will be the distinguishing mark of the gynecologist of the future.

Reifferscheid's contribution deals with the various displacements of the uterus. The author has written a typical textbook chapter, well suited for the beginner but hardly sufficient for the specialist. Details of operative technique, for instance, are lacking. The time-honored Alexander-Adams method, however, has again the seat of honor. What a powerful factor is tradition! I hope that some day a gynecological revolution will rid us of inherited but useless furniture.

The chapter written by Nuernberger is, in reality, a monograph of almost 200 pages on sterility. One can speak of this treatise only in words of highest praise. The subject has been considered exhaustively from every viewpoint—biologically, clinically, therapeutically. Never lose sight of the man's share in female sterility. In one-third of the cases he is the direct cause, in another one-third the indirect one (old gonorrhœa!), and only in the remaining third is the cause found in the woman herself. "Ovarian sterility" should be more often recognized as an etiological factor, but ovarian extracts are practically of no value. A bibliography of 570 references testifies to the thoroughness of the author.

Pankow has succeeded in presenting a clear survey of the difficult and complicated subject of sterilization. Legal, social-hygienic, and social-economic questions had to be considered. The problem of contraception and interruption of pregnancy lies, by no means, solely on medical grounds. In its last analysis, the conscience of the physician must be the deciding factor. The medical indications which, from the present state of our knowledge, demand interference, are presented according to diseases, and they are followed by a discussion of the mechanical, chemical, and operative means at our disposal. Twelve large pages of references in very small type give this article, too, the stamp of thorough preparation.

A FRENCH publisher has recently brought out a series of monographs on cancer, of which the one by Faure on cancer of the uterus[1] is of interest to us. The well-known author devotes the greater part of his book to a detailed consideration of cancer of the cervix which he views largely from the standpoint of surgical treatment. Radium should be reserved for inoperable cases in which its palliative effect is infinitely superior to all other means; but it has no place in operable cases. If applied, in the latter, after operation, it is apt to bring about recurrences; and if used pre-operatively, it stirs up the cancer cells to greater activity and thus vitiates the results of a subsequent operation. The operation of choice must be the extended or radical abdominal hysterectomy, the so-called Wertheim operation. Thanks to the perfection of the technique of this

[1] CANCER DE L'UTÉRUS. By Prof. Jean-Louis Faure. Paris: Librairie Octave Doin, 1925.

operation, "admirable" results may be obtained and "cancer of the cervix is very often cured *permanently*." The immediate results of the operation can be still further improved and the high primary mortality reduced greatly by the systematic use of the Mickulicz tampon.

The thoughtful reader may already have felt some mental reservation regarding these somewhat categorical statements of the author and he will wish to know the statistical proofs on which Faure bases his conclusions. Such statistical data, however, are extremely meager; in fact, they appear only in the form of a footnote. One may freely admit the fallacy of statistics as they are presented so often, but one cannot possibly ignore the value of statistics altogether—least of all in a question in which so much depends on accurate facts and in which impressions and opinions count for so little. Moreover, one may hardly speak of "cures," as Faure does, in patients who have been operated upon less than 3 years ago, and it seems preferable to me that all writers on the subject of uterine cancer should adopt the 5 year limit which was proposed as an international standard.

In sketching the history of the radical operation for cancer of the uterus, the author suggests that the honor of its conception belongs to Ries rather than to Wertheim. Having myself, for many years, emphasized this very point, I feel in accord with Faure in the matter. It is the old story of Columbus and Amerigo Vespucci and the naming of the continent.

While this book is disappointing in some respects, it is interesting and instructive in many others. It reads extremely well and ends with a hopeful note which, while not entirely warranted by actual experiences, is so very helpful in buoying up the optimism one needs in the fight against cancer—"until the victory!"

TWO very thorough scientific contributions have emanated from the Department of Gynecology and Obstetrics of the University of Naples. These studies are published as supplements to the Italian archives of obstetrics and gynecology but, as a matter of fact, represent monographs of 259 pages each.

In the first of these treatises,[1] Bonaretti subjects the human placenta at term to a searching investigation and divides her subject into macroscopic anatomy, microscopic anatomy, and retrogressive changes. A large number of good photomicrographs testifies to the extensive personal work of the authoress. The thoroughness of the monograph may be judged from the bibliography which covers 32 pages and contains practically all of the Italian as well as the foreign literature. This volume will be a very useful reference to research students of this subject.

[1] ANATOMIA DELLA PLACENTA UMANA A TERMINE. By Prof. Dr. Maria E. Dal Collo Bonaretti. Supplemento all' Archivio di Ostetrica e Ginecologia, Napoli, 1923.

THE second treatise deals with the thyroid in pregnancy.[2] After three introductory chapters on the structure, the function and the relations of the thyroid to the genital system, the first part is devoted to an exhaustive presentation of our present knowledge of the behavior of the thyroid in pregnancy and contains chapters on the anatomical, functional, and biochemical changes, and the mechanism of their development. In the second and considerably larger part, the author reports his own researches which have been carried out on 181 women and a number of experimental animals. The conclusions are as follows: In the large majority of the cases the thyroid increases in size during pregnancy and labor; in the puerperium there is a rapid decrease, but in about half the cases a transient increase is noted coincident with the appearance of milk, very rarely also on the seventh day postpartum. The increase in size during pregnancy is due only in a small percentage of cases to hypertrophy and to a much larger extent to hyperæmia and retention of colloid substance; in labor and the puerperium it is almost altogether produced by hyperæmia. The histological and biochemical changes are to be interpreted as a state of hyperfunction; they differ in degree not only in various animals but also in individuals of the same species. The iodine content is slightly increased in pregnancy. The hyperfunction of the human thyroid in pregnancy is quickly reduced to the normal in the puerperium. The clinical manifestations consist of a slight hyperthyroidism and dysthyroidism; occasionally one or the other manifestation or both may be absent. The hyperfunction is almost constant in pregnancy, yet it is not necessarily a concomitant symptom of the latter. All pregnancy changes of the thyroid are largely due to the interruption of ovarian function; the rest of the genital organs probably play some part.

This monograph impresses me as a very valuable study, and I may add that in the extensive bibliography American literature has been quoted extensively.

RACE Hygiene and Heredity[3] is a serious and scientific plea for a thorough and general understanding of biology, heredity and the social, moral, and political application of eugenics, lest the noble and cultured members of our white civilization go the way of those of Athens and Rome. Most of the comfortable, little volume is devoted to the evolution of the theories of biology, which it expounds rather too scientifically for the average American, who in certain unenlightened quarters, legislates against even the teaching of evolution! Dr. Siemens, a profound German scientist, illustrates historically, the development of the laws of heredity down to the

[2] LO STATO DELLA TIROIDE IN GRAVIDANZA. By Dr. Francesco Spirito. Supplemento al' Archivio di Ostetrica e Ginecologia, Napoli, 1923.

[3] RACE HYGIENE AND HEREDITY. By Hermann W. Siemens, M.D. New York: D. Appleton and Company, 1924.

present moment of our recent and intimate acquaintance with cytology.

His treatise, I fear, will never be as accessible to the average reader as Wiggam's *Fruit of the Family Tree*, because it is less popular and psychologic and much more technical and detailed. For instance, the implications of this phrase: "We are all extremely multi-split heterozygotes," would pre-suppose a more intelligent intimacy with biology and Greek than even most educated Americans can boast. Or this excerpt: "The chief mechanisms that improve our people (German), in a paratypic way, are public health movement, education by schools and churches, certain parts of social legislation, and *before the war,—military service*," would tickle our national sense of humor rather than stimulate our hygienic and social conscience.

But this does not reflect upon the merits of the valuable and compact little book of Dr. Siemens, who discusses many vexing problems such as degeneration, inherited characteristics, inbreeding, etc., with an authority that must leave its impress. He deplores the economic complications that make for the practice of voluntary parenthood among the most valuable groups of our population, and he advocates a birth polity administered through carefully regulated taxation and public education that will induce the capable, educated, and professional classes to become sufficiently prolific.

He ends with a threatening pessimism when he says: "Unless these requirements can soon be met, we scarcely dare hope that the race-destroying economic policies and the moral views of the Occident, that are inimical to life, can be overcome before it is too late. For only after these requirements have been met, can the time come when we may finally be done with the cruel folly that, through laws that seem senseless to the biologist, exterminates the most valuable elements of our people."

THE *Hygiene of Marriage*[1] is a textbook on sex hygiene. The problem of this type of book is to steer a middle course between the Scylla and Charybdis of over and understatement of facts. Either practice may wreck the amateur explorer for whom such books are intended; for pathological sex stimulation and secret eroticism are everpresent and dangerous pitfalls in all sex instruction. In spite of the possible harmfulness of such books, education along these lines is absolutely necessary. Whether such education should begin with the infant, adolescent, or prospective bride and groom is a matter upon which social experts and doctors sometimes disagree. However, the book, *Hygiene of Marriage*, is one of the most unoffending of the many dealing with sex questions that the reviewer has yet discovered.

Dr. Hutton, herself, says of her book: "it may seem crude in the reading, for nothing more than the necessary physiological and anatomical aspects have been touched." She accomplishes this in as comprehensive and unspectacular a manner as her subject, which for ages has been exploited in sin, shame, and salaciousness, permits. Still, Dr. Hutton does not neglect the art and æsthetics of marriage. This phase she handles with a common sense that robs it of prudishness and affectation. She insists that a happy home is largely dependent upon the intellectual attitude of the homemakers toward the demands and the compromises of sex.

Chapter I makes a plea for a proper evaluation of all the factors that play a part in a happy and healthy marriage. Dr. Hutton insists that too much emphasis is laid by society upon the economic fitness and marriage settlements. She says: "There is no doubt that the great majority of unhappy marriages are due to the abnormalities in sex life. . . . It is, therefore, of the utmost importance that those entering upon marriage, whether young or old, should be prepared." The succeeding five chapters offer this preparation. They deal with questions of health, disease, and physiology with simple dignity and unprejudiced completeness. They emphasize no one phase, and attack such difficult subjects as frequency of intercourse, adjustment, impotence, and contraceptives, about the use of which she is somewhat conservative, with a directness and naiveté that sublimate her book into social and philosophic channels. When, however, she gives instructions regarding the performance of the sexual act, one wonders whether she might not have taken that much for granted. One closes the book with the distinct feeling that if preparation in sex hygiene is ever to be of practical benefit before actual experience, such preparation must come through efforts of educators like Dr. Hutton.

[1] THE HYGIENE OF MARRIAGE. By Isabel Emslie Hutton, M.D. London: Wm. Heinemann, Ltd., 1923.

CLINICAL CONGRESS OF AMERICAN COLLEGE OF SURGEONS

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PRELIMINARY PROGRAM FOR THE PHILADELPHIA MEETING

IN the following pages will be found a tentative program for the evening meetings for the Philadelphia session of the Clinical Congress of the American College of Surgeons as arranged by the Executive Committee of the Congress. It will be noted that all of these meetings are to be held in the Ballroom of the Bellevue-Stratford. At the Presidential meeting on Monday evening the President-Elect, Dr. Rudolph Matas of New Orleans, will deliver his inaugural address and Sir Arbuthnot Lane of London, England, the Murphy Oration in Surgery. At the convocation on Friday evening the Fellowship Address is to be given by Lord Dawson, London, England, physician to King Edward.

The preliminary clinical program is being reprinted in this issue. This program, still in a tentative stage, is to be revised and amplified previous to the meeting, so that the final program will fully represent the clinical activities in Philadelphia in all departments of surgery. The real program of the Congress is to be issued daily during the session giving in complete detail a description of the clinics and demonstrations at the several hospitals and medical schools. This program will be issued in the form of bulletins posted each afternoon at headquarters for the following day's clinics. A printed program will be issued each morning.

A series of clinical demonstrations or "dry clinics," in which surgeons, internists, pathologists, roentgenologists, and other specialists will participate to discuss some of the more important phases of surgery, forming an important feature of the clinical program, are being arranged at a number of the larger hospitals.

Of special interest to those engaged in the practice of ophthalmology and otolaryngology is the program of papers and demonstrations prepared by the Committee to be given in the Ballroom on Wednesday, Thursday, and Friday

mornings at nine o'clock supplementing the clinical work in the hospitals in the afternoon.

General headquarters of the Congress will be established at the Bellevue-Stratford Hotel, Broad and Walnut streets, where the entire first floor, including the Ballroom, Clover, Red, Pink, and Gold rooms, together with the Stratford Room on the main floor and the Rose Garden and other rooms on the roof, have been reserved for the exclusive use of the Congress. These rooms provide ample space for evening meetings, business sessions, hospital standardization headquarters, registration and ticket bureaus, bulletin rooms, etc.

The clinical program for Tuesday will be posted on bulletin boards during Monday afternoon and reservations for tickets for Tuesday's clinics may be filed late that afternoon.

The annual meeting of the Fellows of the College will be held in the Ballroom of the Bellevue-Stratford on Thursday afternoon at three o'clock to be followed by the annual meeting of the Board of Governors.

Since the last session of the Congress in Philadelphia in 1921 there have been erected in that city a number of fine, large hotels situated within easy walking distance of the Bellevue-Stratford, so that the hotel situation in that city has been greatly improved. A list of the Philadelphia hotels recommended by the Local Committee on Arrangements, together with their rates, will be found on another page.

HOSPITAL CONFERENCE

In this issue will also be found the preliminary program for the annual hospital conference to be held on Monday, Tuesday, and Wednesday, both mornings and afternoons, at the Bellevue-Stratford. Addresses, demonstrations, round table conferences, and general discussions by surgeons, superintendents, trustees, nurses, and others interested in the conduct of hospitals deal intimately with the details of hospital standardization and management, providing a program of very great interest and practical value in treating many of the everyday problems and difficulties encountered in hospital management and the care of the patient within the hospital.

At the opening session on Monday morning, Dr. Franklin H. Martin, Director-General, will present his report including a list of the hospitals which appear on the approved list for the year 1925.

A hospital information and service bureau, in charge of Dr. M. T. MacEachern, Associate Director in charge of hospital standardization activities, will be maintained in the Congress headquarters throughout the session to give assistance to any hospital seeking solutions of its troublesome problems. All who are particularly interested in hospital problems are requested to register at hospital standardization headquarters upon arrival at Philadelphia. A general invitation is extended to hospital trustees, members of the medical and surgical staffs, and hospital personnel generally to attend the conference.

REDUCED RAILWAY FARES

The railways of the United States and Canada have authorized reduced fares on account of the Philadelphia session of the Clinical Congress, so that the total fare for the round trip will be one and one-half the ordinary first-class one-way fare. To take advantage of the reduced rates it is necessary to pay the full one-way fare to Philadelphia, procuring from the ticket agent a "convention certificate" when purchasing such ticket, which certificate is to be deposited at headquarters for the visé of the special agent of the railway companies. Upon presentation of viséed certificate to the ticket agent in Philadelphia not later than November 3 a ticket for the return journey by the same route as traveled to Philadelphia may be purchased at one-half the regular one-way fare.

In the eastern, central and southern states and eastern provinces of Canada tickets may be purchased between October 22 and 28; in southwestern and western states between October 21 and 27 and in the far western states and western provinces of Canada between October 16 and 22. The return journey from Philadelphia must be begun not later than November 3.

The reduction in fares does not apply to Pullman fares, nor to excess fares charged for passage on certain trains. Local railroad ticket agents will supply detailed information with regard to rates, routes, etc. Stop-overs on both the going and return journeys may be had within certain limits.

Full fare must be paid from starting point to Philadelphia, and it is essential that a "convention certificate" be obtained from the agent from whom the ticket is purchased. These certificates are to be signed by the general manager of the Clinical Congress and viséed by a special agent of the railroads in Philadelphia during the meeting. No reduction in railroad fares can be secured except in compliance with the regulations outlined and within the dates specified. It is important to note that the return trip must be made by the same route as used to Philadelphia and that

the certificate must be presented and return ticket purchased not later than November 3.

LIMITED ATTENDANCE

Attendance at the Philadelphia session will be limited to a number that can be comfortably accommodated at the clinics, the limit of attendance being based upon the result of a survey of the amphitheaters, operating rooms, and laboratories in the hospitals and medical schools as to their capacity for accommodating visitors. This plan necessitates registration in advance on the part of all who wish to attend. When the limit of attendance has been reached through advance registration, no further applications can be accepted.

Attendance at clinics and demonstrations will be controlled by means of special clinic tickets, which plan has proved an efficient means in the past for providing for the distribution of visiting surgeons among the several clinics and insures against overcrowding, as the number of tickets issued for any clinic is limited to the capacity of the room in which that clinic is given.

REGISTRATION FEE

A registration fee of $5.00 is required of each surgeon attending the annual clinical meeting, such fees providing the funds with which to meet the expenses of the meeting. To each surgeon registering in advance a formal receipt for the registration fee is issued, which receipt is to be exchanged for a general admission card upon his registration at headquarters during the meeting. This card, which is nontransferable, must be presented to secure clinic tickets and admission to the evening meetings.

PHILADELPHIA HOTELS AND THEIR RATES

	Minimum Rate for Room with Bath	
	Single	Double
Adelphia, Chestnut and 13th Sts.	$4.00	$8.00
Bellevue-Stratford, Broad and Walnut Sts.	5.00	8.00
Benjamin Franklin, Chestnut and 9th Sts.	3.00	6.00
Green's, 8th and Chestnut Sts.	3.50	5.00
Longacre, Walnut St. West of Broad	4.00	6.00
Lorraine, Broad St. and Fairmont Ave.	2.50	5.00
Majestic, Broad St. and Girard Ave.	4.00	5.00
Robert Morris, 17th and Arch and the Parkway	3.00	5.00
Pennsylvania, Chestnut and 39th Sts.	3.00	6.00
Rittenhouse, Chestnut and 22nd Sts.	3.50	5.00
Ritz-Carlton, Broad and Walnut Sts.	6.00	10.00
Spruce (men only), Spruce and 13th Sts.	4.00	.....
St. James, Walnut and 13th Sts.	3.50	5.00
Stenton, Broad and Spruce Sts.	5.00	7.00
Sylvania, Locust and Juniper Sts.	4.00	6.00
Walton, Broad and Locust Sts.	3.00	5.00

PRELIMINARY PROGRAM FOR EVENING MEETINGS

IN THE BALLROOM OF THE BELLEVUE-STRATFORD AT 8 O'CLOCK

Presidential Meeting—Monday, October 26

Address of Welcome: CHARLES F. NASSAU, M.D., Chairman of Committee on Arrangements.

Address of Retiring President: CHARLES H. MAYO, M.D., Rochester, Minnesota.

Introduction of Foreign Guests.

Inaugural Address: RUDOLPH MATAS, M.D., New Orleans.

The Doctor John B. Murphy Oration in Surgery: SIR WILLIAM ARBUTHNOT LANE, Bt., London, England.

Tuesday, Wednesday, and Thursday, October 27, 28, and 29

PROFESSOR VITTORIO PUTTI, Bologna, Italy: Congenital Dislocation of the Hip.
Discussion: DEFOREST P. WILLARD, M.D., Philadelphia.

W. BLAIR BELL, B.S., M.D., Liverpool, England: The Treatment of Chronic Ascending Infections of the Uterus and Adnexa by the Bell-Beuttner Operation with Ovarian Conservation or Grafting.
Discussion: JOHN G. CLARK, M.D., and BROOKE M. ANSPACH, M.D., Philadelphia.

ARTHUR H. CURTIS, M.D., Chicago: Chronic Pelvic Infections; Deductions Resultant from a Combined Clinical and Laboratory Study.

ROBERT C. COFFEY, M.D., Portland, Oregon: The Principles of the Radical Treatment of Cancer of the Organs Located in the Pelvis.
Discussion: JOHN B. DEAVER, M.D., and GEORGE P. MULLER, M.D., Philadelphia.

Symposium on the Rehabilitation of the Handicapped Patient.

A. MURAT WILLIS, M.D., Richmond, Virginia: The Mortality in Important Surgical Diseases, Especially Appendicitis.
Discussion: DAMON B. PFEIFFER, M.D., and JOHN STEWART RODMAN, M.D., Philadelphia.

CHEVALIER JACKSON, M.D., Philadelphia: Chalk Talk.

Convocation—Friday, October 30

Invocation.

Conferring of Honorary Fellowships.

Presentation of Candidates for Fellowship.

Presidential Address: RUDOLPH MATAS, M.D., New Orleans.

Fellowship Address: The RIGHT HON. LORD DAWSON OF PENN, G.C.V.O., C.B., London, England, Physician in Ordinary to H. M. The King.

HOSPITAL STANDARDIZATION CONFERENCE

IN THE BALLROOM OF THE BELLEVUE-STRATFORD

Monday, October 26—Morning Session, 10:00 to 12:30

CHARLES H. MAYO, M.D., Rochester, President, Presiding

Opening Address by the President.

Presentation of the Eighth Annual Report of Hospital Standardization. FRANKLIN H. MARTIN, M.D., Chicago, Director-General, American College of Surgeons.

The Responsibility of the Fellows of the American College of Surgeons in Hospital Standardization. LEROY LONG, M.D., Oklahoma City, Okla.; Dean and Professor of Surgery, University of Oklahoma School of Medicine.

The Hospital, the Doctor and the Nurse as Co-operating Factors in the Care of the Patient. W. T. HENDERSON, M.D., Mobile, Ala.; Visiting Surgeon, Providence Infirmary and Mobile City Hospital.

The Eminent Hospital. REV. C. B. MOULINIER, S.J., Milwaukee; President, Catholic Hospital Association.

What the American College of Surgeons Can Do for the Smaller Hospital. PAUL H. FESLER, Oklahoma City, Okla.; Superintendent, State University Hospital.

Hospital Efficiency from the Viewpoint of the Internist. ALFRED T. STENGEL, M.D., Philadelphia; Professor of Medicine, University of Pennsylvania; President, American College of Physicians.

Political Interference in Hospitals. RUDOLPH MATAS, M.D., New Orleans; Professor of Surgery, Tulane University of Louisiana School of Medicine; President-Elect, American College of Surgeons.

Afternoon Session, 2:00 to 5:00

The Hospital of the Future. NEWTON E. DAVIS, Chicago; President, American Protestant Hospital Association; Corresponding Secretary, Board of Hospitals, Homes and Deaconess Work of the Methodist Episcopal Church.

The Application of American College of Surgeons Standards in the Modern Hospital. H. L. FOSS, M.D., Danville, Pa.; Surgeon-in-Chief, Geisinger Memorial Hospital.

Essentials for an Efficient Fracture Service in a Hospital. CHARLES L. SCUDDER, M.D., Boston; Consulting Surgeon, Massachusetts General Hospital.

End-Results and Follow-Up. HENRY L. PAGE, M.D., Philadelphia; Medical Director, Lankenau Hospital; and MISS ANNIE M. JASTROW, Philadelphia, Record Librarian, Lankenau Hospital.

Post Mortems in Hospitals

Findings in the State of Pennsylvania Survey. FRANK C. HAMMOND, M.D., Philadelphia; Dean and Professor of Gynecology, Temple University Department of Medicine.

Relation of the Surgeon to Post Mortems. CHARLES BAGLEY, JR., M.D., Baltimore; Associate in Experimental Neurology, Johns Hopkins University Medical Department.

Post Mortems in the Open Hospital. ISRAEL BROWN, M.D., Norfolk, Va.; Surgeon, St. Vincent's Hospital and Sanitarium.

General discussion.

Tuesday, October 27—Morning Session, 10:00 to 12:30

Group Conference on Medical Service in Hospitals—Ophthalmology and Oto-Laryngology. JAMES A. BABBITT, M.D., Philadelphia, Associate Professor of Oto-Laryngology, University of Pennsylvania Graduate School of Medicine, presiding. A complete program for this conference will be published in the next issue.

Afternoon Session, 2:00 to 5:00

The Rôle of the Medical Staff in Hospital Efficiency. J. GARLAND SHERRILL, M.D., Louisville; Professor of Surgery, University of Louisville Medical Department.

Round Table Conference. Conducted by JOSEPH C. DOANE, M.D., Philadelphia, Medical Director and Superintendent, Philadelphia General Hospital. Topics for discussion: The relation and responsibility of the hospital administration in pre-operative preparatory procedures; the relations and responsibilities of the interne; the best methods of making more efficient the instruction and experience of the internes and nurses in the surgical department; responsibility of the surgeon in promoting economies in the surgical department; the most efficient arrangement of concurrent staff services in relation to duty; the essentials for an efficient anæsthesia department; supervision and control of the surgical department; the "Open Hospital" policy; the best means for handling extra charges for special services; the education of new trustees in regard to the hospital and its workings.

General discussion.

Wednesday, October 28—Morning Session, 10:00 to 12:30

Group Conference on Medical Service in Hospitals—Internal Medicine. ALFRED T. STENGEL, M.D., Philadelphia; Professor of Medicine, University of Pennsylvania, President, American College of Physicians, presiding. A complete program for this conference will be published in the next issue.

Afternoon Session—2:00 to 5:00

Systematic Collection and Official Publication of Operative Mortalities as a Means of Fostering Surgical Accountancy. ROBERT L. DICKINSON, M.D., New York; Senior Gynecologist and Obstetrician, Brooklyn Hospital.

Round Table Conference Conducted by JOHN D. SPELMAN, M.D., New Orleans; Superintendent, Touro Infirmary. Topics for discussion: A plan of procedure in selecting members of the medical staff and extending privileges to doctors to practice therein; the ownership of the case record; the best means of improving the quality of case records; the relation of medical staff to board of trustees; the hospital and the private duty nurse; the relative advantages and disadvantages of continuous versus divided ward services in a hospital; dental service in hospitals; isolation, segregation, and observation accommodations in all hospitals; the problem of the tuberculous patient in the general hospital; physiotherapy in hospitals.

General discussion.

GENERAL SURGERY, GYNECOLOGY, OBSTETRICS ORTHOPEDICS, UROLOGY

UNIVERSITY HOSPITAL

Tuesday

JOHN G. CLARK, C. C. NORRIS, and F. E. KEENE—9. Gynecology.
C. H. FRAZIER, F. GRANT, and TEMPLE FAY—9. Neurosurgery.
B. C. HIRST, E. B. PIPER, J. C. HIRST, II, J. K. JAFFE, G. V. JANVIER, and W. BENSON HARER—9. Obstetrics and gynecology.
GEORGE P. MULLER and I. S. RAVDIN—9. General surgery.
A. BRUCE GILL—9. Orthopedics.
CHEVALIER JACKSON and GABRIEL TUCKER—3. Bronchoscopy.

Wednesday

JOHN G. CLARK, C. C. NORRIS, and F. E. KEENE—9. Gynecology.
E. L. ELIASON and DRURY HINTON—9. General surgery.
A. RANDALL, S. W. MOORHEAD, P. S. PELOUZE, and MAURICE MUSCHAT—2. Urology.

Thursday

JOHN G. CLARK, C. C. NORRIS, and F. E. KEENE—9. Gynecology.
C. H. FRAZIER, F. GRANT, and TEMPLE FAY—9. Neurosurgery.
B. C. HIRST, E. B. PIPER, J. C. HIRST, II, J. K. JAFFE, G. V. JANVIER, and W. B. HARER—9. Obstetrics and gynecology.
G. P. MULLER and I. S. RAVDIN—9. General surgery.
A. BRUCE GILL—9. Orthopedics.
CHEVALIER JACKSON and GABRIEL TUCKER—3. Bronchoscopy.

Friday

JOHN G. CLARK, C. C. NORRIS, and F. E. KEENE—9. Gynecology.
C. H. FRAZIER, F. GRANT, and TEMPLE FAY—9. Neurosurgery.
B. C. HIRST, E. B. PIPER, J. C. HIRST, II, J. K. JAFFE, G. V. JANVIER, and W. B. HARER—9. Gynecology and obstetrics.
E. L. ELIASON and DRURY HINTON—9. General surgery.
A. BRUCE GILL—9. Orthopedics.

MISERICORDIA HOSPITAL

Tuesday

BASIL BELTRAN and staff—9. General surgery.
JAMES A. KELLY and staff—9. General surgery.

Wednesday

GEORGE P. MULLER and THOMAS RYAN—9. General surgery.
PETER M. KEATING—9. Clinical demonstration.
J. F. X. JONES—2. General surgery.

Thursday

BASIL BELTRAN and staff—9. General surgery.
JAMES A. KELLY and staff—9. General surgery.

Friday

GEORGE P. MULLER and THOMAS RYAN—9. General surgery.
PETER M. KEATING—9. Clinical demonstration.
J. F. X. JONES—2. General surgery.

JEFFERSON HOSPITAL

Tuesday

J. TORRANCE RUGH—9:30. Orthopedics.
CHARLES F. NASSAU—11. General surgery.
THOMAS C. STELLWAGEN—11. Genito-urinary surgery.
JOHN H. GIBBON—2. General surgery.

Wednesday

CHEVALIER JACKSON—9. Bronchoscopy for diagnosis and treatment of diseases of the lungs.
BROOKE M. ANSPACH and staff—9. Gynecology.
P. BROOKE BLAND—9. Gynecology.
W. H. KINNEY—11. Genito-urinary surgery.
JOHN B. FLICK—11. General surgery.
J. CHALMERS DACOSTA—2. Surgical clinic.

Thursday

H. R. LOUX—9. Genito-urinary surgery.
J. M. FISHER—11. Gynecology.
THOMAS A. SHALLOW—11. General surgery.
ARTHUR DAVIDSON—11. Orthopedic surgery.
CHEVALIER JACKSON, GABRIEL TUCKER, and LOUIS CLERF—12:30. Bronchoscopic aspiration in suppurative diseases of the lung.

Friday

EDWARD J. KLOPP—11. General surgery.

HOWARD HOSPITAL

Tuesday

A. C. WOOD—9. General surgery.
E. L. ELIASON, DRURY HINTON, and V. W. M. WRIGHT—10:30. General surgery. Industrial surgery clinic. Outline of system of records, follow-up. Routine surgery.

Wednesday

B. C. HIRST—9. Gynecology.

Thursday

A. C. WOOD—9. General surgery.
E. L. ELIASON, DRURY HINTON, and V. W. M. WRIGHT—10:30. Fracture clinic, methods and results.
E. L. ELIASON—11. Routine surgery under local anæsthesia.
S. W. MOORHEAD—4. Genito-urinary clinic.

Friday

B. C. HIRST—9. Gynecology.

PRESBYTERIAN HOSPITAL

J. H. JOPSON, JOHN SPEESE, D. B. PFEIFFER, J. S. RODMAN, and HENRY P. BROWN, JR. General surgery.
JOHN H. GIRVIN, GEORGE M. LAWS, and PHILIP WILLIAMS. Gynecology.
B. A. THOMAS and staff. Genito-urinary surgery.
A. BRUCE GILL and T. E. ORR. Orthopedic surgery.
FRANK CROZER KNOWLES and HENRY G. MUNSON. Dermatology.
JOHN A. EIMAN and W. EDGAR CHRISTIE; JOHN H. GIRVIN and staff; B. A. THOMAS and F. G. HARRISON. Surgical and special pathology.
WILLIAM S. NEWCOMET. Roentgenology.
Operative clinics daily at 9. Demonstrations and pathological exhibits in new out-patient and laboratory building at 2:30.

LANKENAU HOSPITAL

Tuesday

STANLEY P. REIMAN—9. Demonstrations in new laboratory.
A. G. MILLER and ROBERT SHOEMAKER—11. Demonstration in roentgenology.
F. L. HARTMAN—11. Demonstration of follow-up system.

Wednesday

STANLEY P. REIMAN—9. Demonstration in new laboratory.
F. L. HARTMAN—11. Demonstration of follow-up system.
A. G. MILLER and ROBERT SHOEMAKER—11. Demonstration in roentgenology.
JOHN B. DEAVER—12. General surgery.

Thursday

F. L. HARTMAN—11. Demonstration of follow-up system.
A. G. MILLER and ROBERT SHOEMAKER—11. Demonstration in roentgenology.
JOHN B. DEAVER—12. General surgery.
WILLIAM H. MACKINNEY—5:30. Cystoscopy.

Friday

STANLEY P. REIMAN—9. Demonstration in new laboratory.
A. G. MILLER and ROBERT SHOEMAKER—11. Demonstration in roentgenology.
F. L. HARTMAN—11. Demonstration of follow-up system.

CHILDREN'S HOSPITAL

Tuesday

J. H. JOPSON—9. Diagnosis in surgical diseases of the abdomen.
J. C. GITTINGS—9. Some medical aspects of surgical cases.
C. W. BURR and F. E. LEAVITT—9. Neurosurgical problems in children.
C. C. NORRIS—2. Vaginitis in infants and young children; methods of treatment.

Wednesday

W. ESTELL LEE and J. R. WELLS—9. Problems in thoracic surgery. Treatment of burns.
R. S. BROMER—9. X-ray in thoracic and gastro-intestinal lesions.

Thursday

HOWARD C. CARPENTER—9. Health examination in children.
EMILY P. BACON—9. Demonstration of nutritional work in children.
SUSAN C. FRANCIS, R. N.—9. Problems in management of surgical wards.

Friday

JOHN SPEESE and W. EDGAR CHRISTIE—9. Postoperative management of surgical cases.
HENRY P. BROWN and ERNEST G. WILLIAMSON—9. Management of the surgical out-patient department.

WOMAN'S COLLEGE HOSPITAL

Tuesday

LIDA STEWART-COGILL—9. Prenatal clinic.

Wednesday

J. S. RODMAN and staff—9. General surgery.

Thursday

CATHARINE MACFARLANE—2. Gynecology.

Friday

J. S. RODMAN and staff—9. General surgery.

ST. JOSEPH'S HOSPITAL

Tuesday

JOSEPH M. SPELLISSY—9. Dry clinic: Operative mechanical treatment of some of the effects of infantile paralysis.
JOHN F. X. JONES—11. General surgery; appendectomy, gall-bladder disease.

Wednesday

MELVIN M. FRANKLIN—9. General surgery; influence of prosthetics upon amputations; chronic, nontuberculous suppuration in bone.
F. HURST MAIER—11. Gynecology; hysterectomy for myofibromata, plastic for procidentia, suspension for retroflexion.

Thursday

JAMES A. KELLY—9. General surgery; fracture clinic.

Friday

CHARLES F. NASSAU—9. General surgery; subtotal thyroidectomy under local anæsthesia, hernioplasty under local anæsthesia.
P. BROOKE BLAND—11. Gynecology; application of radium for uterine myofibromata, trachelorrhaphy and perineorrhaphy, abdominal hysterectomy.

PHILADELPHIA GENERAL HOSPITAL

Tuesday

FRANK C. HAMMOND—10. Gynecological operations.
WILLIAM H. MACKINNEY—2. Genito-urinary operations.

Wednesday

ALFRED C. WOOD—9. General surgery.
J. T. RUGH—11. Orthopedic surgery.
STAFF—2. Symposium on Cancer: J. B. CARNETT, general surgery; HENRY K. PANCOAST, radiology; C. C. NORRIS, gynecology; J. F. SCHAMBERG, dermatology; ROBERT G. TORREY, medical; GEORGE M. DORRANCE, faciomaxillary; F. O. LEWIS, laryngology. Visit to radium emanation plant and deep therapy laboratories.

Thursday

J. B. CARNETT, J. RALSTON WELLS, ROBERT BRADLEY and JAMES P. WEATHERWAX—9. Non-operative cancer clinic.
EDWARD A. SCHUMANN—2. Gynecological operations.

Friday

T. T. THOMAS—9. General surgery.
C. C. NORRIS—11. Gynecological clinic, cancer operations.
EDWARD B. KRUMBHAAR and staff of pathologists—4. Clinicopathological conference, demonstrating current interesting pathological conditions and specimens. Open discussion is invited at this conference.

NORTHEASTERN HOSPITAL

Wednesday

H. Z. HIBSHMAN—9. Anorectal infections.
T. TURNER THOMAS—10. General surgery.
JOHN B. LOWNES and J. A. BROADFIELD—3. Operative and cystoscopic clinic.

Thursday

T. TURNER THOMAS—2. Dry clinic: Results with non-operative reduction, especially of wrist, elbow, shoulder, hip, and ankle. Operative reductions. Compound fractures. Recurrent dislocations of shoulder. Brachial birth palsy.

METHODIST EPISCOPAL HOSPITAL

Tuesday

JAMES H. BALDWIN—9. Gas gangrene, foreign body in bladder, fractures of patella, foreign body in brain.
MILTON F. PERCIVAL—9. Daily demonstrations of X-ray technique, fluoroscopy, pyelograms, electrocoagulation, radio knife, and photography.

Wednesday

WILLIAM R. NICHOLSON—9. Vesicovaginal fistula, cystocele, prolapse of uterus, cervical repairs and repairs of perineum.
LEVI JAY HAMMOND—2. Surgery of gall tracts, stomach, spleen, and pancreas.

Thursday

DAMON B. PFEIFFER—9. Carcinoma of the rectosigmoid, blood transfusions, surgery of the gall bladder, stomach, and intestines.
RICHARD C. NORRIS—2. Abdominal gynecology, retroversion, uterine and ovarian tumors, cæsarean section.

Friday

J. T. RUGH—9. Arthrodesis, correction of paralytic deformities, stabilization of the hip joint and spinal bone grafts.
LEON HERMAN—1. Prostatectomy, renal calculus, hypernephroma, malignant tumors of the bladder, cystoscopy, and pyelography.

MT. SINAI HOSPITAL

Tuesday

CHARLES F. NASSAU—9. Radical cure of hernia, local anæsthesia.
G. ROSENBAUM—12. X-rays of gastro-intestinal tract.

Wednesday

M. BEHREND—9. Surgery of bile passageways and gastro-intestinal tract. Presentation of cases.
M. COOPERMAN—2. Gonorrhœal arthritis, dislocation of hip, astragalectomy, Whitman reconstruction operation.
G. TUCKER—4. Bronchoscopy and œsophagoscopy.

Thursday

J. C. HIRST—9. Prolapse of uterus, cystoscopy, vaginal repair.
G. ROSENBAUM—12. X-rays of gastro-intestinal tract.
G. TUCKER—4. Bronchoscopy and œsophagoscopy.

Friday

C. MAZER—9. Plastic, Rubin test, and pyelography.
C. HIRSH—11:30. Demonstration of cases.

COOPER HOSPITAL (Camden)

Tuesday

THOMAS B. LEE, ALBERT B. DAVIS, and GORDON WEST—9. Gynecology.

Wednesday

PAUL M. MECRAY and Associates—10. General surgery.
A. HAINES LIPPINCOTT and DAVID BENTLEY, JR.—2:30. Genito-urinary and rectal clinic.
B. F. BUZBY—2:30. Orthopedic clinic.

Thursday

THOMAS B. LEE, ALBERT B. DAVIS, and GORDON WEST—9. Gynecology.

Friday

PAUL M. MECRAY and Associates—10. General surgery.
B. F. BUZBY—2:30. Orthopedics.

STETSON HOSPITAL

Tuesday

JOHN A. BOGER and WILLIAM T. ELLIS—1. General surgery; herniotomy, appendectomy, cholecystotomy, reduction of fractures.

Wednesday

S. E. TRACY and Associates—9. Gynecological clinic. Plastic operations, trachelorrhaphy, trachelectomy, anterior colporrhaphy, perineorrhaphy, myomectomy and hysterectomy for fibroids, shortening of the round ligaments, conservative operations for pelvic inflammatory conditions.

Thursday

BROOKE M. ANSPACH and Associates—9. Gynecological clinic.

Friday

S. E. TRACY and Associates—9. Gynecological clinic.
CARL F. KOENIG—1. Roentgenology. Diagnostic and deep therapy clinic.

WOMAN'S HOSPITAL

Tuesday

SARAH H. LOCKREY and EMILY WHITTEN-AUGE—9. Gynecology.
LIDA STEWART-COGILL and ELIZABETH HUGHES—2. Obstetrics.
JULIA HARDIN—Gas-oxygen and ethylene anæsthesia.

Wednesday

MARIE K. FORMAD and ALBERTA PELTZ—9. Gynecology.
ELLA WILLIAMS GRIM and ALBERTA PELTZ—3. Obstetrics.
JULIA HARDIN—Gas-oxygen and ethylene anæsthesia.

Thursday

CATHARINE MACFARLANE and FAITH S. FETTERMAN—9. Gynecology.
MARY LEWIS and DELLA MILDAZIAS—3. Obstetrics.
JULIA HARDIN. Gas-oxygen and ethylene anæsthesia.

Friday

KATE W. BALDWIN—9. General surgery.
ELIZABETH F. C. CLARK—11. Gynecology.
ANN TOMKINS GIBSON and JESSIE W. PRYOR—2. Obstetrics.
EMILY WHITTEN-AUGE—3. General surgery.
JULIA HARDIN. Gas-oxygen and ethylene anæsthesia.

ST. LUKE'S HOSPITAL

Tuesday

DESIDERIO ROMAN—9. General surgery.
O. F. BARTHMAIER—11. Demonstration of blood transfusion.

Wednesday

A. B. WEBSTER—9. General surgery.
J. WALTER POST—11. Demonstration in roentgenology.
WILLIAM C. HUNSICKER and J. MILLER KENWORTHY—2. Genito-urinary surgery and cystoscopy.

Thursday

DESIDERIO ROMAN—9. Operations upon thyroid and demonstration of group study of thyroid disease.

Friday

A. B. WEBSTER—9. General surgery.
J. WALTER POST—11. Demonstration in roentgenology.
WILLIAM C. HUNSICKER and J. MILLER KENWORTHY—2. Genito-urinary surgery and cystoscopy.

HAHNEMANN HOSPITAL

Tuesday

L. T. Ashcraft, William C. Hunsicker, Frank C. Benson, Jr.—9. Urologic clinic. Symposium on tumors of the urinary bladder and on carcinoma of the prostate. Demonstration of local anæsthesia.

J. E. James, Jr., and Leon Clemmer—10. Obstetrical clinic. Salient points in pelvimetry. The rôle of version in obstetrical surgery. Cervico-abdominal hysterectomy.

F. W. Smith—2. Bronchoscopic work on the cadaver.

F. C. Benson, Jr.—3. Radium clinic. Technique of application and results in superficial malignant tumors. Limitations, contra-indications, and dangers in radium therapy.

Wednesday

H. L. Northrop—9. Thoracic surgery.

D. B. James and E. B. Craig—9. Gynecological clinic. Malignancy of the uterus.

W. C. Mercer and J. B. Bert—10. Obstetrical clinic. Forceps application with special reference to the cephalic application in posterior oblique positions. The mechanism of labor.

S. W. Sappington—3. Demonstration of various methods of blood transfusion.

Thursday

J. D. Elliott and William M. Sylvis—9. Operative clinic. Tumors of the breast. Discussion of the pathology and end-results of treatment by X-rays, radium, and operation.

D. B. James—9. Gynecological clinic.

O. B. Waite and N. F. Paxson—10. Obstetrical clinic. Prenatal care. Practical results of routine Wassermann tests. Pre-eclampsia and eclampsia. Fetal mortality.

J. A. Brooke—2. Orthopedic clinic. Shortening of bones of the leg to correct inequality in length. Demonstration of new bone skid. Results of astragalectomy in paralytic foot.

J. W. Frank—3. Roentgenologic clinic. Comparison of newer forms of roentgen treatment for malignancy with former methods. Presentation of patients.

Friday

G. A. Van Lennep and H. P. Leopold—9. Surgery of the stomach and duodenum.

N. F. Lane and D. W. Culin—9. Uterine bleeding, diagnosis and treatment.

ST. AGNES HOSPITAL

Tuesday

E. C. Murphy—9. Dry clinic: Exhibition of fracture cases with end-results by operative and non-operative procedures.

John F. X. Jones—9. General surgery, operative clinic.

John A. McGlinn—9. Gynecology. Exhibition of patients treated for acute inflammatory diseases by means of nonspecific proteins. Demonstration of method of treatment of gonorrhœa in the female by heat.

Wednesday

G. M. Dorrance and J. W. Bransfield—9. Operative clinic and demonstration of cases. Cleft palate cases operated on by the new method, elongation of palate.

John M. Fisher—9. Gynecology.

Wilbur B. Haines—2. Genito-urinary surgery.

J. C. Hirst and staff—2. Gynecology and obstetrics.

SAMARITAN HOSPITAL

Tuesday

John Leedom, J. O. Bower, G. Mason Astley, John C. Frick, and J. N. Coombs—9. Surgical clinic.

Harry Hudson—2. Orthopedic clinic.

Albert Strickler—3. Dermatology.

Wednesday

W. Wayne Babcock—9. General surgery.

Charles S. Barnes and C. M. Stimson—11. Obstetrics.

Frank C. Hammond—2. Gynecology.

W. Hershey Thomas—4. Genito-urinary surgery.

Harry Z. Hibshman—5. Rectal clinic.

Thursday

A. C. Applegate—11. Obstetrics.

Friday

W. Wayne Babcock—9. General surgery.

FRANKFORD HOSPITAL

Wednesday

W. E. Parke—9:30. Plastics, plastic and retroversion of uterus.

E. A. Schumann—9:30. Fibroid of uterus, carcinoma of uterus, plastic and section.

G. C. Hanna—9:30. Cæsarian section.

F. E. Keller—9:30. Cæsarian section, local anæsthesia.

Thursday

Charles F. Nassau—9:30. Cholelithiasis, duodenal ulcer, nephrolithiasis, goiter.

Louis D. Englerth—9:30. Hernia under local anæsthesia, fracture clinic.

POLYCLINIC HOSPITAL

Tuesday

DeForest P. Willard—10:30. Orthopedics.

G. E. Pfahler—2. Radiologic conference.

B. A. Thomas—2. Urology.

Wednesday

R. H. Ivy and Lawrence Curtis—10. Oral surgery.

W. G. Elmer—11:30. Orthopedic surgery.

Thursday

Collier F. Martin—1. Proctology.

J. F. Schamberg—2. Arsphenamin clinic.

Friday

R. H. Ivy—9. Maxillofacial surgery.

B. A. Thomas—2. Urology.

E. A. Case—2. Surgical pathology.

AMERICAN ONCOLOGIC HOSPITAL

Tuesday

W. S. Newcomet—10. Cases of angioma, treated and under treatment, selected from a group of 200.

Samuel McClary, 3rd.—10. Cases of cancer of the lip and mouth.

ST. CHRISTOPHER'S HOSPITAL

E. G. Alexander—10. Surgical clinic: Hernia, appendix, pyloric stenosis, undescended testicle, harelip, empyema and bone cases. Surgery in children.

ST. MARY'S HOSPITAL

Tuesday

JAMES A. KELLY—9. General surgery.
WILLIAM J. RYAN—9. General surgery.
WILBUR H. HAINES and L. F. MILLIKEN—2. Genito-urinary clinic.
W. T. REES. Laboratory demonstration.

Wednesday

WILLIAM A. STEEL—9. Abdominal surgery with spinal anæsthesia.
A. P. KEEGAN—9. General surgery and local anæsthesia.
C. HOWARD MOORE—2. Orthopedic clinic, operations and demonstration of cases.
W. T. REES. Laboratory demonstration.

Thursday

FRANK D. HARRIS—9. Gynecology.
WILLIAM F. MORRISON—9. Gynecology.
WILLIAM E. PARKE and J. STUART LAWRENCE—12:30. Obstetrical clinic, labor room and ward walks. Operations. Prenatal clinic.
W. T. REES. Laboratory demonstration.

JEWISH HOSPITAL

Tuesday

M. BEHREND—9. General surgery.
W. H. TELLER—2. General surgery.

Wednesday

F. B. BLOCK—9. General surgery.
L. BRINKMAN—2. General surgery.

Thursday

M. BEHREND—9. General surgery.
F. B. BLOCK—2. General surgery.

Friday

L. BRINKMAN—9. General surgery.
W. H. TELLER—2. General surgery.

PENNSYLVANIA HOSPITAL

Tuesday

CHARLES F. MITCHELL, W. ESTELL LEE, HENRY P. BROWN, and LEON HERMAN—11. General surgery.

Wednesday

JOHN H. GIBBON, ARTHUR E. BILLINGS, EDWARD J. KLOPP, JOHN B. FLICK, and LEON HERMAN—11. General surgery.

Thursday

JAMES CAMERON—9. Oral surgery.
J. R. PAUL—10. Surgical pathology.
CHARLES F. MITCHELL, W. ESTELL LEE, HENRY P. BROWN, and LEON HERMAN—11. General surgery.

CHESTNUT HILL HOSPITAL

Tuesday

ANDREW GODFREY and WILLIAM SHEEHAN—10. General surgery.
ALEXANDER RANDALL—2. Urology.

Wednesday

J. MURRAY ELLZEY—10. Fracture clinic.

Thursday

J. F. MCCLOSKEY—10. General surgery.

EPISCOPAL HOSPITAL

Tuesday

RALPH S. BROMER—9. X-ray demonstration.
LOUIS H. MUTSCHLER—11. Operative clinic, general surgery.

Wednesday

ASTLEY P. C. ASHHURST, IRVINE M. BOYKIN, and EDWARD T. CROSSAN—9. Operative clinic, general surgery.
A. BRUCE GILL, RUTHERFORD L. JOHN, and ALBERT F. MOXEY—2. Orthopedics.

Thursday

E. G. ALEXANDER—9. Operative clinic, general surgery.
H. C. DEAVER—11. Operative clinic, general surgery.

Friday

E. T. CROSSAN—9. Demonstration in surgical pathology.
L. H. MUTSCHLER—11. Operative clinic, general surgery.
JOHN B. HAINES—2. Cystoscopic clinic.

MEDICO-CHIRURGICAL HOSPITAL

Tuesday

J. B. CARNETT—9. General surgery.
GEORGE M. BOYD—11. Gynecology.

Wednesday

GEORGE W. OUTERBRIDGE—9. Cystoscopy.
WILLIAM R. NICHOLSON—9. Gynecology.

Friday

J. B. CARNETT—9. General surgery.
GEORGE M. BOYD—11. Gynecology.

KENSINGTON HOSPITAL FOR WOMEN

Tuesday

WILLIAM E. PARKE—11. Prenatal clinic, history taking, pelvimetry, blood-pressure records, obstetrical analgesia.
H. C. DEAVER—12:30. General surgical clinic.

Friday

DANIEL LONGAKER—11. Potter version statistics and demonstration of available material.

WOMEN'S HOMEOPATHIC HOSPITAL

Tuesday

JOHN A. BROOKE—2. Orthopedics.

Wednesday

ARTHUR HARTLEY—2. General surgery.

Friday

FRANCOIS L. HUGHES—10. Gynecology.

CHILDREN'S HOMEOPATHIC HOSPITAL

Tuesday

H. P. LEOPOLD—2. General surgery.

Wednesday

JOHN BROOKE—2. Orthopedic clinic: After-results in epiphyseal fractures; club hand; syphilitic joints; joint changes in endocrine disturbances.

Thursday

A. KORNDOERFER, JR.—2. Obstetrical clinic.

NORTHWESTERN GENERAL HOSPITAL

Tuesday

J. O. Arnold—2. Obstetrical clinic. Perineotomy, an improved technique.

Wednesday

J. T. Schell—9. General surgery.

Thursday

Arthur D. Kurtz—3:30. Orthopedic dry clinic.

Friday

Robert Boyer—11. Genito-urinary clinic. Suprapubic prostatectomy.

ORTHOPEDIC HOSPITAL

Tuesday

Astley P. C. Ashhurst, Rutherford L. John, Edward T. Crossan, and B. F. Buzby—1. Orthopedic demonstration.

Thursday

Astley P. C. Ashhurst, Rutherford L. John, Edward T. Crossan, and B. F. Buzby—9. Orthopedic operations.

Friday

A. Bruce Gill, C. R. Bowen, and James E. Wyant. Orthopedic clinic.

SURGERY OF THE EYE, EAR, NOSE AND THROAT

CLINICAL DEMONSTRATIONS AND PAPERS

Ballroom, Bellevue-Stratford

Tuesday—9 a.m.

Group conference on problems related to the Hospital Standardization Program as applied to ophthalmological and otolaryngological services.

Wednesday—9 a.m.

Philip Franklin, London, England: The Clinical Aspect of Tonsils.

Discussion: George B. Wood, Philadelphia; C. W. Richardson, Washington; C. G. Coakley, New York.

Chevalier Jackson, Philadelphia: Laryngofissure for Cancer of the Larynx.

Discussion: Harmon Smith, New York; H. W. Loeb, St. Louis; Louis H. Clerf, Philadelphia.

Harry S. Gradle, Chicago: The Practical Use of the Slit Lamp in Daily Routine.

Discussion: Hunter H. McQuire, Winchester, Va.; Alfred Cowan, Philadelphia; Luther C. Peter, Philadelphia.

Douglas Quick, New York: Use of Radium and X-ray in the Treatment of Malignant Disease of the Paranasal Sinuses.

Discussion: D. Crosby Greene, Boston; Charles E. Pancoast, Philadelphia; G. E. Pfahler, Philadelphia.

John E. MacKenty, New York: Laryngectomy in One Stage, Comments on One Hundred Operations.

Discussion: Fielding O. Lewis, Philadelphia.

Thursday—9 a.m.

F. Earnest Whitnall, Montreal, Canada: Tenon's Capsule.

J. C. Beck, Chicago: Some of the Important Complications from Ear, Nose, and Throat Diseases and Operations and Their Management.

Discussion: George M. Coates, Philadelphia; Ralph Butler, Philadelphia.

E. C. Ellett, Memphis, Tenn.: The Use of the Suture in Cataract Extraction.

Discussion: Lewis Ziegler, Philadelphia; William Zentmayer, Philadelphia.

Wells P. Eagleton, Newark, N. J.: Meningitis of Aural Origin.

Discussion: S. MacCuen Smith, Philadelphia; James A. Babbitt, Philadelphia; H. I. Lillie, Rochester, Minn.

T. E. Carmody, Denver: Observations of Children's Sinuses in Health and Diseases.

Discussion: Ross H. Skillern, Philadelphia; Leon E. White, Boston.

Friday—9 a.m.

Major Edmund B. Spaeth, Takoma Park, Md.: Ophthalmic Plastic Surgery. Lantern slide demonstration.

George M. Dorrance, Philadelphia: Rhinoplasty, presentation of cases and lantern slide demonstration.

Warren B. Davis, Philadelphia: Some Types of Harelip and Cleft-palate Deformities and Their Operative Results. Presentation of patients and lantern slide demonstration.

Charles F. Nassau, Philadelphia: Closure of Laryngostomic Fistulæ. Lantern slide and moving picture demonstration.

WILLS EYE HOSPITAL

Tuesday

Burton Chance, Frank C. Parker, Leighton F. Appleman, and Benjamin F. Baer, Jr.—2. Ophthalmic operations.

Wednesday

William Zentmayer, Paul J. Pontius, J. Milton Griscom, and Thomas A. O'Brien—2. Ophthalmic operations.

Thursday

Burton Chance, Frank C. Parker, Leighton F. Appleman, and Benjamin F. Baer, Jr.—2. Ophthalmic operations.

Friday

William Zentmayer, Paul J. Pontius, J. Milton Griscom, and Thomas A. O'Brien—2. Ophthalmic operations.

MEDICO-CHIRURGICAL HOSPITAL

Tuesday

George M. Coates—2. Otolaryngology.

Wednesday

Ross H. Skillern—2. Laryngology.

Thursday

George M. Coates—2. Otolaryngology.

Friday

Ross H. Skillern—2. Laryngology.

EPISCOPAL HOSPITAL

Tuesday

W. R. WATSON, EDWARD W. COLLINS, and OTTO C. HIRST—2. Otolaryngology.
HAROLD G. GOLDBERG, DAVID J. BOONE, and WILLIAM H. CHANDLEE—2. Ophthalmology.

Wednesday

A. G. FEWELL, WARREN S. REESE, J. B. RUDOLPHY, and FRED HERBERT, JR.—2. Ophthalmology.
W. R. WATSON and Associates—2. Otolaryngology.

Thursday

FREDERICK KRAUSS and J. B. FELDMAN—2. Ophthalmology.
CHARLES C. BIEDERT, THOMAS R. CURRIE, and WILLIAM MATTHEWS—2. Otolaryngology.

Friday

CHARLES C. BIEDERT and Associates—2. Otolaryngology.
HAROLD G. GOLDBERG and Associates—2. Ophthalmology.

ST. JOSEPH'S HOSPITAL

Tuesday

GEORGE M. MARSHALL—2. Otolaryngology; osteoplastic correction of the nasal bones, radical maxillary sinus operation.
PAUL J. PONTIUS—2. Ophthalmology; enucleation with gold ball insertion, iridectomy.

Wednesday

CHARLES J. JONES—2. Ophthalmology; preliminary iridectomy for cataract, simple extraction.
WILLIAM E. QUICKSALL—2. Otolaryngology; tonsillectomy by Fetterolf's method, submucous resection.

Thursday

THOMAS A. O'BRIEN—2. Ophthalmology; combined extraction, Elliott trephine for glaucoma.
ARTHUR WRIGLEY—2. Otolaryngology; replacement of laterally displaced tip of quadrangular cartilage with submucous resection, tonsillectomy by decapsulation with dissection and snare.
CORNELIUS T. MCCARTHY—2. Otolaryngology; radical mastoidectomy, ethmoidectomy.

UNIVERSITY HOSPITAL

Tuesday

THOMAS B. HOLLOWAY—2. Ophthalmology.
G. FETTEROLF, J. A. BABBITT, D. HUSIK, and LEWIS FISHER—3. Otolaryngology.

Wednesday

G. FETTEROLF, J. A. BABBITT, D. HUSIK, and L. FISHER—3. Otolaryngology.

Thursday

THOMAS B. HOLLOWAY—2. Ophthalmology.

Friday

THOMAS B. HOLLOWAY—2. Ophthalmology.
GEORGE FETTEROLF, J. A. BABBITT, DAVID HUSIK, and LEWIS FISHER—3. Otolaryngology.

CHILDREN'S HOMEOPATHIC HOSPITAL

FRED W. SMITH—Tuesday, 2. Laryngological clinic, hypertrophied tonsils and adenoids.

MISERICORDIA HOSPITAL

Tuesday

JOHN E. LOFTUS—2. Otolaryngology.

Wednesday

C. T. MCCARTHY—2. Otolaryngology.
HAROLD GOLDBERG—3. Ophthalmology.

Thursday

JOHN E. LOFTUS—2. Otolaryngology.
JOHN A. COLGAN—3. Ophthalmology.

Friday

C. T. MCCARTHY—2. Otolaryngology.

HOWARD HOSPITAL

Tuesday

G. B. WOOD—2. Laryngology.

Wednesday

W. C. POSEY—2. Ophthalmology; varied eye operations.

Thursday

G. B. WOOD—2. Laryngology.

Friday

W. C. POSEY—2. Ophthalmology.

ST. MARY'S HOSPITAL

Tuesday

FRANK MURPHY—2. Eye clinic.

Wednesday

EDWARD MURPHY, WILLIAM P. GRADY, and ALBERT J. DEVLIN—3. Otolaryngology.

MT. SINAI HOSPITAL

Tuesday

L. FISHER—2. Tonsil and sinus surgery. Bárány test.
C. W. LEFEVER—4. Cataract, glaucoma, muscle work.

Thursday

S. J. GITTELSON—2. Demonstration of cases.

Friday

A. W. WATSON—2. Mastoid and tonsil surgery.

JEFFERSON HOSPITAL

Thursday

FIELDING O. LEWIS—2. Otolaryngology.

Friday

HOWARD F. HANSELL and WILLIAM M. SWEET—2. Ophthalmology.
S. MACCUEN SMITH and J. CLARENCE KEELER—2. Otology.

METHODIST EPISCOPAL HOSPITAL

Tuesday

WALTER ROBERTS—2. Deviated septum, tonsillectomies and adenoidectomies, mastoid disease and malignant disease of the larynx, bronchoscopy.
PHILIP H. MOORE—4. Enucleation, foreign body in the eye, strabismus, glaucoma.

POLYCLINIC HOSPITAL

Tuesday

T. B. Holloway—2. Ophthalmology.

Wednesday

Walter Roberts—2. Otolaryngology.
E. B. Gleason—3. Otolaryngology.
L. C. Peter—3. Ophthalmology.

Thursday

George B. Wood—3. Laryngology.
Ralph Butler—3. Laryngology.

CHESTNUT HILL HOSPITAL

Wednesday

Benjamin Parish and John Davies—2. Otolaryngology.

Thursday

Carl Williams—2. Ophthalmology.

CHILDREN'S HOSPITAL

Wednesday

H. Maxwell Landon and A. R. Renninger—2. Ophthalmology.

Thursday

James A. Babbitt and Staff—2. Otolaryngology.

WOMAN'S COLLEGE HOSPITAL

Tuesday

Margaret F. Butler—2. Otolaryngology.

Friday

Mary Buchanan—3. Ophthalmology.

JEWISH HOSPITAL

Wednesday

J. Knipe—3. Eye clinic.

Thursday

S. McC. Smith and A. S. Kaufman—3. Otological clinic.
H. M. Goddard—4. Nose and throat clinic.

HAHNEMANN HOSPITAL

Tuesday

G. J. Palen—2. Résumé of mastoid operation by otological department.

Thursday

H. S. Weaver and C. B. Hollis—2. Nose and throat clinic.

Friday

F. O. Nagle—2. Eye clinic. Pathology of the eye.

ST. AGNES HOSPITAL

Tuesday

Benjamin D. Parish—2. Otolaryngology.

Wednesday

Warren B. Davis—2. Otolaryngology.
George F. J. Kelly—2. Ophthalmology.

WOMAN'S HOSPITAL

Tuesday

Laura E. Hunt and Mary Hipple—2. Otolaryngology.

Wednesday

Margaret A. Warlow—1:30. Otolaryngology.
Mary Buchanan—2. Ophthalmology.

Thursday

Margaret F. Butler and Louis van Loon—2. Otolaryngology.

COOPER HOSPITAL (Camden)

Tuesday

L. B. Hirst, E. R. Hirst, and Alfred Elwell—2:30. Otolaryngology.

Thursday

L. B. Hirst, E. R. Hirst, and Alfred Elwell—2:30. Otolaryngology.

FRANKFORD HOSPITAL

Tuesday

Frank Embery—9:30. Tonsil and mastoid clinic.
W. J. Watson—9:30. Tonsil clinic.

PRESBYTERIAN HOSPITAL

H. Maxwell Langdon and Staff. Ophthalmology.
N. P. Stauffer and Staff. Otolaryngology.

NORTHEASTERN HOSPITAL

Wednesday

George E. Shaffer—2. Caldwell-Luc operation.
Granville A. Lawrence—4. Ophthalmology.

STETSON HOSPITAL

Carle L. Felt and Associates—1. Otolaryngological clinic: Tonsillectomy and adenoidectomy, mastoidectomy, resection of septum.

UNIVERSITY OF PENNSYLVANIA MEDICAL SCHOOL

E. B. Gleason and Philip S. Stout. Operative work on the mastoid and labyrinth. Demonstration of the cadaver.

WOMEN'S HOMEOPATHIC HOSPITAL

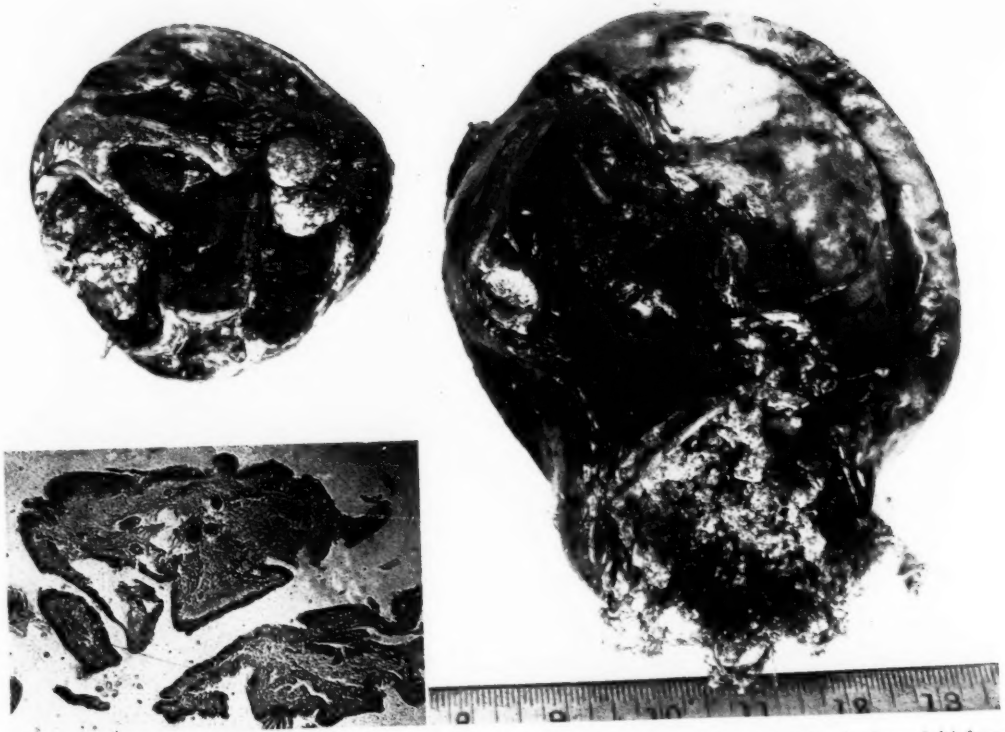
Joseph F. V. Clay—Thursday, 2. Otolaryngology.

PHILADELPHIA GENERAL HOSPITAL

David N. Husik—Friday, 2. Otolaryngological operations.

SAMARITAN HOSPITAL

Luther C. Peter—Tuesday, 4. Ophthalmology.



Figs. 1 and 2. Bilateral cystic teratomata (dermoids) from a patient 20 years of age. Section (at lower left) from a cystic teratoma (dermoid) showing beginning malignancy, papillary adenocarcinoma.

Teratomata—Ovarian and Retroperitoneal.—Onslow A. Gordon